

May-June 1997

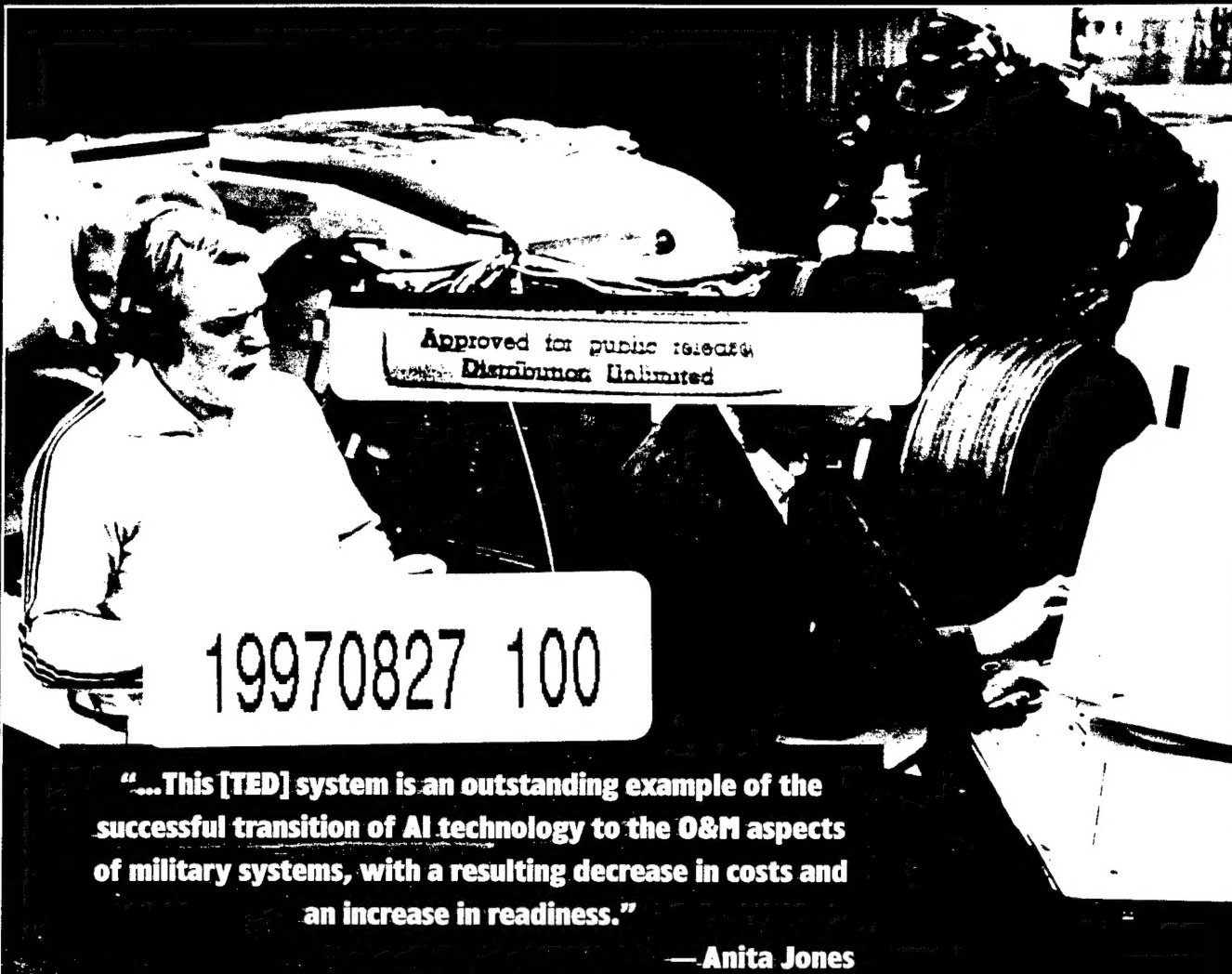
PROGRAM MANAGER

SECDEF and DAE Hold Joint Press Conference

DSMCAA Opens New Chapter

National Space Reconnaissance Data Capabilities

Army's M1 Tank Mechanics Toss Their TMs & Trust TED



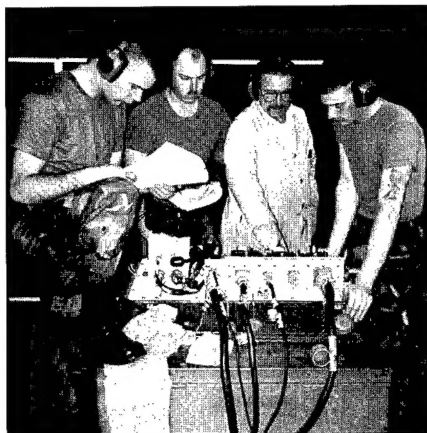
"...This [TED] system is an outstanding example of the successful transition of AI technology to the O&M aspects of military systems, with a resulting decrease in costs and an increase in readiness."

—Anita Jones

Director, Defense Research & Engineering

PROGRAM MANAGER

Vol XXVI, No. 3, DSMC 138



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Meet TED, the Army's Computerized Tank Mechanic

Collie J. Johnson

"If you're going to stay in a comfort zone, then you're not going to field the system."

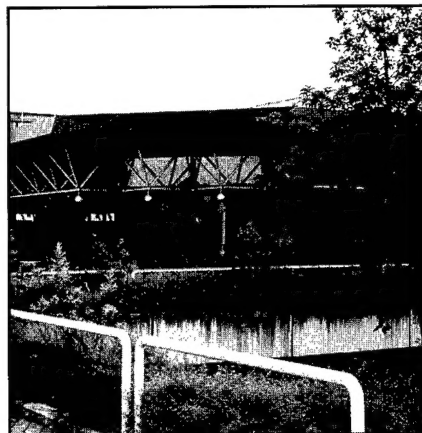


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SECDEF and DAE Jump Start Acquisition Reform Week at Pentagon Press Conference

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Preparations Underway for Ninth Annual Acquisition/Procurement Seminar

Richard Kwatnoski

Mannheim, Germany, site of 1997 International Acquisition/Procurement Seminar.

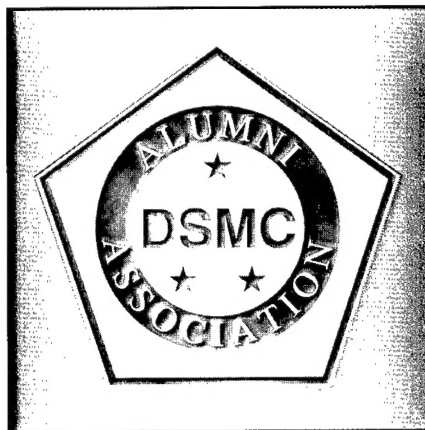


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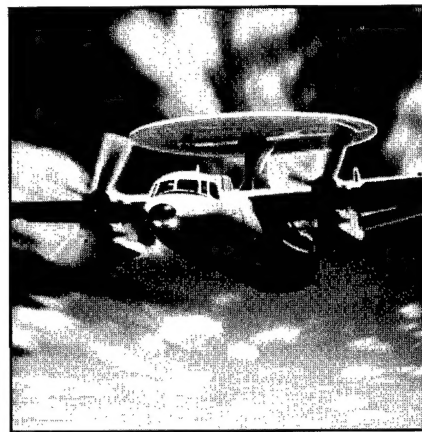


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DSMC Alumni Association

Norene L. Blanch • Collie J. Johnson

Here's your chance to read about a truly world-class gathering of acquisition professionals.



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Just Buy It At Radio Shack!

Cmdr. Andy Mohler, USN

Deputy Program Manager for Foreign Military Sales of the E-2C Hawkeye dispels myths about commercial off-the-shelf software in military electronic applications.

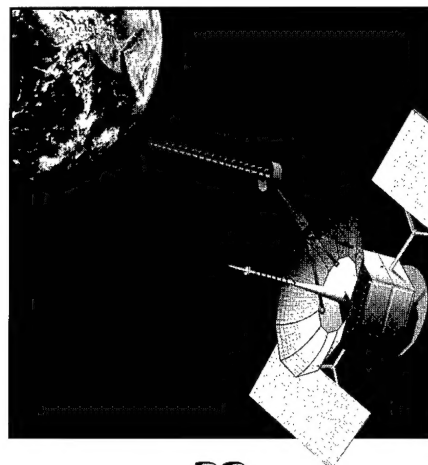
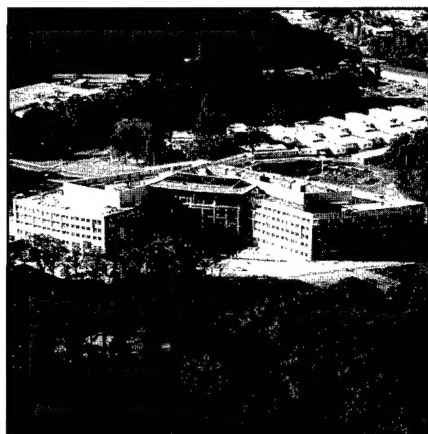
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Cover: Pictured from left are Dr. Richard Helfman, John Dumer, and Army Master Sgt. Ralph Ishman, Army Research Laboratory, diagnosing and troubleshooting an M1 tank engine using the Army's Turbine Engine Diagnostic (TED) System. Some photos appearing in this publication may be digitally enhanced.



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DSMCAA Welcomes Newest Chapter to Southern Maryland

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Naval Air Station Patuxent River, Md., prepares for influx of Naval acquisition personnel.

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Seed Money Available to Develop and Prototype National Space Reconnaissance Data Capabilities

Capt. Alicia Graham, USAF

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Correction

The cutline for the photo at the top of p. 15, March/April 1997 issue of *Program Manager* magazine, incorrectly identified two officers. The caption should read: From left: DSMC Professor Al Beck; Navy Capt. Vance Toalson, Chief of Staff and Deputy

Commander, OPTEVFOR; Navy Rear Adm. Steven Baker, Commander OPTEVFOR.

On pp. 54 and 55, Army Col. Charles Westrip, Jr., was incorrectly identified as a Lt. Col. His correct rank is Col.



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Meet TED, The Army's Computerized Tank Mechanic

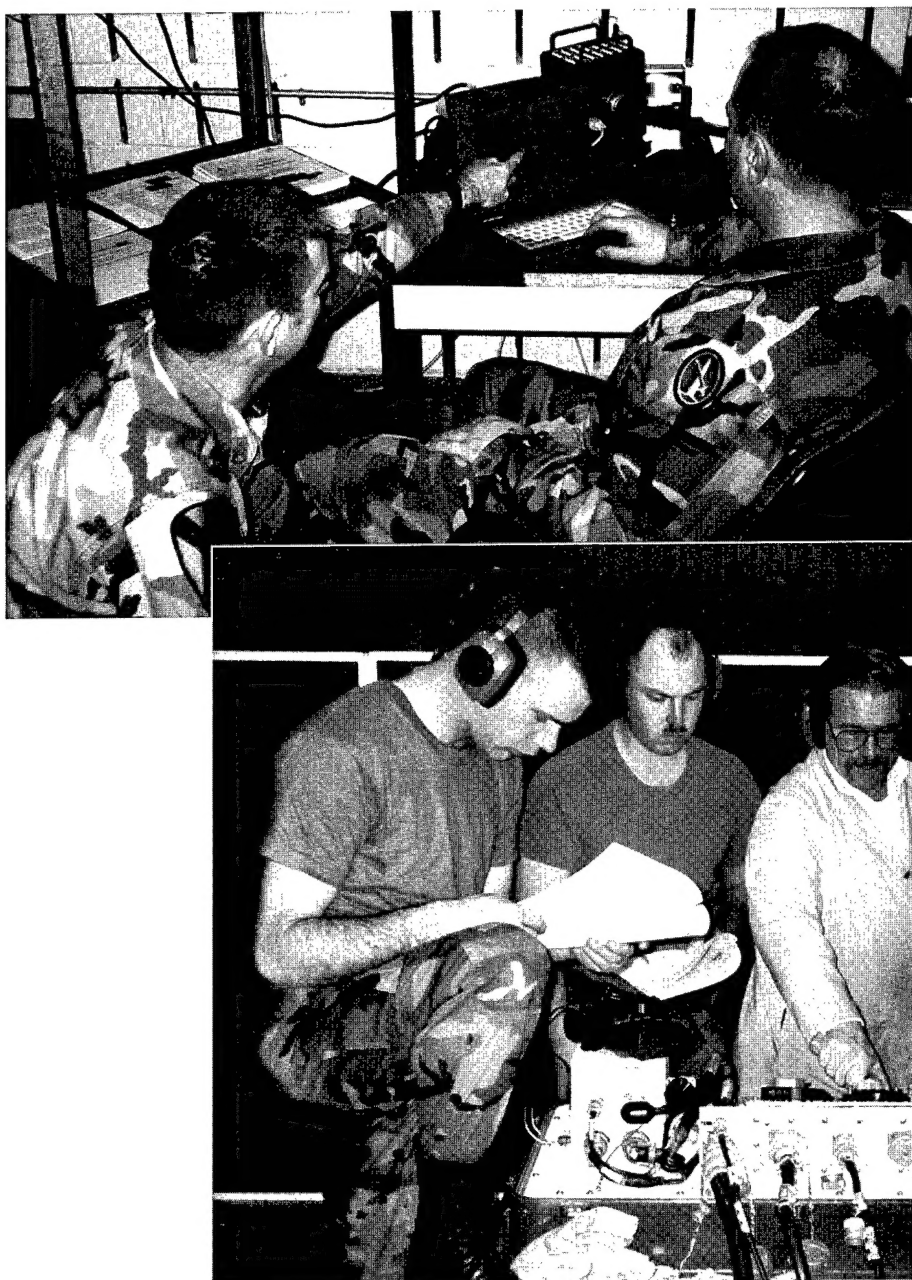
"If You're Going to Stay in a Comfort Zone, Then You're Not Going to Field the System"

COLLIE J. JOHNSON

If your circle of friends includes Army tank mechanics, no doubt you've heard of the new guy on the block—TED. And no doubt, TED is already or will soon be making your life much easier. Just who, or more appropriately what is TED? The Turbine Engine Diagnostics System or TED, developed by the Army Research Laboratory at Aberdeen Proving Ground, Md., is already paving the way for soldiers to toss their technical manuals (TM) and trust TED. In an Army that still routinely hands out 1,000-page TMs to its tank mechanics, TED is a passport to the information age; as one soldier put it, "TED is my buddy."

A typical TED demo to a class of tank mechanics observing the software perform for the first time, generates an enthusiasm and type of "word of mouth" advertisement that money can't buy. Typically these soldiers want to know where they can get TED, how, and how soon. The class instructor, Army Staff Sgt. Eddie Smith fires up an actual M1 tank engine and ensures they not only observe, but actually get into the system to troubleshoot and diagnose. They learn that a health maintenance check of the engine, which was a manual process that lasted two to three hours and required two mechanics, could now be done by TED in about 10 minutes (half of which is warm up time for the engine). That gets their attention.

Army's M1 Tank Mechanic



Johnson is managing editor, Program Manager magazine, DSMC Press.

Photos courtesy Army Research Laboratory

TED not only helps tank mechanics diagnose system faults, but can also order required spare parts, provide step-by-step instructions on how to perform required repairs, perform tests to ensure that the repairs correct the problem, maintain necessary maintenance records and associated forms, and provide a comprehensive online tutorial on AGT-1500 turbine engine maintenance procedures. TED also features online tutorials on Microsoft Windows, the Ground-Hop Support Set (GHSS), Automated

Breakout Box (ABOB) and the Digital Multimeter.

More good news—the TED software is Windows-compliant and will run on any 486 computer with 8 Megs of RAM, a 500 Meg hard drive, a Super VGA monitor, and a mouse. TED will also run on any touch screen-compatible computer and functions well on a desktop as well as a laptop.

As of January 1997, there were 65 Army National Guard units using TED

and ABOB. Fielding to active Army and Marine units is expected to begin in spring 1997, with a goal of 200 copies of TED and ABOB to all maintenance support units with M1 tanks.

The TED package being fielded to Army maintenance units includes both hardware and software. The hardware, called ABOB (Automated Breakout Box), consists of a standard issue BOB (Breakout Box) with circuits added to select one of the 128 channels and convert the analog signal to digital before passing it to the computer. The TED software is issued on CD and replaces the 7-foot stack of manuals for the M1 engine.

PM Abrams has officially recognized the hardware and software, designating the TED CD as TM 9-2500-511-34&P, and assigning NSN 5999-01-436-8900 to the ABOB.

Why the Need?

By August 1991, several factors were contributing to the selection of tank maintenance as an appropriate domain for further development and research into expert diagnostics systems. First, it became apparent that the Army Ordnance Corps was going through a dramatic reduction in force, a large component of which was the loss of aggregate years of master diagnostician expertise in turbine engine diagnostics and repair. This realization, coupled with the rising cost to maintain the Abrams AGT-1500 gas turbine engine, caused the Ordnance School Directorate of Combat Developments to consider various options to improve turbine engine diagnostics. One of the options discussed was the development of an expert system that would capture those diagnostic heuristics (or rules of thumb) that are often lost as master diagnosticians retire or leave the service. In addition, TED was to be easy to use and must allow a novice mechanic the capability to perform his or her duties as well as a master diagnostician.

A second reason for choosing tank maintenance dealt with a new Army

Loss Their TMs & Trust TED



DTIC QUALITY INSPECTED 2

TED has been cited as a project that exemplifies three key elements of our Defense Science and Technology Strategy: the ubiquity and importance of information technologies, the need for greater attention to affordability, and the priority on accelerated transition to operational use. As evidenced by the rapid acceptance and appreciation of TED's capabilities by Army personnel, this system is a clear example of the successful transition of artificial intelligence (AI) technology to the operations and maintenance aspects of military systems, with a resulting decrease in costs and an increase in readiness.

I would like to point out that the tutorial system, Diagnostic Intelligent Tutoring System (DITS), which complements TED as a diagnostic trainer, was initially funded by the U.S. Army AI Center. As part of the DoD Science and Technology (S&T) program, this AI Center has been instrumental in the development, promotion, and transition of AI technology within the Department.

Artificial intelligence technology will continue to be funded and developed within the DoD S&T program, with increasing emphasis on transition to operational use. I anticipate that we will have many more examples—of which TED is an outstanding one—of the practical utility of this technology in the not-too-distant future."

— **Anita K. Jones**
Director, Defense
Research & Engineering
January 2, 1997



funding directive called Stock Funding of Depot Level Repairables (SFDLR). If you were a company commander in the past, and one of your tanks broke down, it was fixed for free (as far as you, the commander, were concerned). Today, as that same commander, you are billed for your maintenance costs. The hope of the new doctrine is that it will reduce overall maintenance costs, without adversely affecting unit readiness. Fortunately, the Army realized that SFDLR alone, without better maintenance aids for the mechanic, was not the final answer to reducing high maintenance costs. Hence, TED was developed to provide the mechanic with a computer program that enables apprentice mechanics to perform like master mechanics, thereby increasing diagnostic efficiency without a substantial investment in new test equipment or increased training costs.

The third reason for choosing a tank maintenance domain was a revision to current Army maintenance doctrine. Under the new doctrine, when an engine fails it is pulled from the tank and sent to Direct Support (DS). The tank hull remains at the unit, a new engine is sent forward, and the tank is quickly returned to full operational status. The defective engine is then analyzed at DS and if repairs can be

made at DS, it is returned to standby status for use in another tank.

However, if repairs include depot-level tasks, the engine must be evacuated. The U.S. Army Tank Automotive Command realized that a large portion of the AGT-1500 depot-level repairs could be performed at DS level.

TACOM initiated a program to authorize many of these maintenance tasks at DS level. That program is referred to as DS (+). TED provided the platform from which depot-level maintenance exper-

tise (most of which was civilian and contractor-based), could be readily communicated to DS mechanics in an understandable and easy-to-use format. The adoption of DS(+) will markedly improve Abrams readiness rates.

The Real Work Begins

Responding to the Army's need for a light-weight, visual expert system that will provide the best diagnostic procedures available for the Army's M1 AGT-1500 turbine engine, the U.S. Army Ordnance Center and School took the lead. In August 1991, they put together a team of computer scientists from Army Research Laboratory (ARL); subject matter experts (SME) from the Army Ordnance Center and School (USAOC&S); contractor personnel from Textron-Lycoming; systems analysts from Strategic Logistics Agency (now referred to as Logistics Integration Agency); training specialists; and cognitive psychologists from Applied Science Associates. Under the direction of program manager, Army Lt. Col. Orlando Illi, Jr., this team of diversified specialists began what has become the first artificial intelligence project to be funded, monitored, and fielded by the Army.

Early into the TED project, the TED program manager chartered a study panel to establish specific design goals for TED functionality. This group consisted of Textron-Lycoming (the AGT-1500 prime contractor) engineers; Ordnance School SMEs from the Directorate of Combat Developments and the Directorate of Training; Ordnance School turbine engine maintenance instructors and their students (AIT, NCO, and warrant officer); and ARL computer scientists. After the study was completed, the TED team developed the following three design goals: capable of supporting multiple levels of expertise on each screen, which would enable an apprentice AIT graduate mechanic to use TED and function at the same level as a master diagnostician; as easy to use as a video game; and flexible enough to allow for rapid prototyping.

First and foremost, TED software needed to perform basic diagnostics and produce results that routinely would meet or exceed the accuracy expected of the most experienced mechanic. It needed to enable an AIT graduate to perform his or her duties at a master diagnostician level, which would allow TED to exhibit an overall effectiveness that would be significantly better than the system it is replacing. Otherwise, it will lose soldier respect, and it will not be used.

Soldiers will always ask the most experienced mechanic why something does not work. These master diagnosticians have a sixth sense and "know" what is wrong with the engine. It was the TED team's desire to have that "sixth sense" built into TED so that novice and apprentice mechanics could benefit from years of aggregate expertise. The problem was how best to design an expert system that would not bore the expert and baffle the beginner, but still enable both to benefit and to increase their efficiency.

Given the requirement to make TED useful for all three categories of mechanics, the TED team decided to design the main screen at the expert level. This would allow each screen to provide three levels of expertise: expert, novice, and apprentice. Experts need little or no help from TED. Novice mechanics (recent AIT Graduates) require extensive step-by-step instructions, while apprentice mechanics (those with more than one year of experience after AIT) need a system that enables them to ask for additional information. Once the main diagnostic screen is accessed, the soldier can control the level of interaction through the use of HOW, WHY, HELP, and TOOLS buttons for each task performed. The HOW button gives the user more help, in the form of additional text and graphical images, and will automatically drop the user into a lower skill level (as described in the preceding paragraph). The WHY button gives the user a global picture: why the test is performed, and why he or she is being asked certain questions.

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In addition, it informs the user of the current goals of the system. All WHY information is presented in a text window. The HELP button provides the user with helpful hints for performing a specific task. The TOOLS button displays all required tools and special test equipment. In addition, TED's online tutorial provides a comprehensive review of turbine engine maintenance procedures for all levels of expertise. As TED is used, mechanics' skill levels improve, and they require less help from TED.

"Initially we thought that was going to be overkill," said Illi, "but it wasn't. We were looking at it from a technical standpoint of, 'Yes, I know and understand the system I'm looking at.' But you've got to remember who the ultimate user will be. I guess what we learned is it was always going back to the 19-year-old that graduates from Aberdeen Proving Ground as a 63 Echo. And as long as we focused on the soldier, it became easy for us."

Second, TED had to be easy to use, or otherwise it will sit on the shelf. Mechanics have favorite stories of diag-

nostic equipment that does nothing but occupy lots of storage space. The TED team targeted the current generation X soldier who has been raised on video games. TED software was designed in that vein, making it easy and fun to use. Each screen had the same format, with color photos and pop-up windows. All the soldier was required to do was point and click with a mouse or a touch-screen computer.

Third, it must be flexible enough to allow for insertion of updated modules without affecting the entire logic structure. This feature was extremely important in that the TED team routinely incorporated recommended changes gleaned from basic and advanced NCO course students, who were shown new modules as they were developed. "Once the students commented on the applicability of the module," said Illi, "changes were incorporated—often as the soldiers looked on. It was a powerful tool that enabled us to incorporate those ideas and changes that the soldier wanted rapidly, without having to completely rework the entire system."

About the Software

The main diagnostic software in TED is a Windows-based shell called *Visual Expert* from SOFTSELL™. *Visual Expert* is based on a procedural reasoning paradigm called Procedural Reasoning System (PRS).^{1,2} PRS is a visual method of encoding reasoning strategies used by expert problem solvers. The knowledge is represented graphically with semantics suited to the procedural, goal-oriented style of problem solving, and PRS is best suited for problems that are both procedural and goal oriented, e.g., diagnostics, including triage or deciding what problem to fix first.

A procedural approach uses an ordered, step-by-step prescription to obtain a desired result, possibly including alternate paths in case of failure. Such an approach is also goal oriented if some steps are goals to be achieved rather than specific actions to

be performed.³ Army TMs closely follow this paradigm. They are often graphical in nature with decision trees displayed on the page. Some nodes represent goals to be achieved; others represent specific tasks to be performed.

From TED's main menu screen, the mechanic is given access to the entire TED system. As shown in Figure 1, TED separates this access into three main modules and two special applications. The first main module, entitled TED, directs the mechanic to the bulk of the diagnostic and maintenance expertise. The second main module, Automated Breakout Box (ABOB), allows the automatic interrogation of the signals from the engine. In the final main module, Repair Parts and Special Tools List (RPSTL), is found the automation of the repair parts and special tools system. Under the two special applications are the Diagnostic Intelligent Tutoring System (DITS) and special system administration functions.

First Main Module—TED

The main TED module separates the troubleshooting and maintenance routines into three specific areas:

- Inspections
- Operational Checks
- Maintenance Procedures

Inspections. The inspections module guides mechanics through a series of detailed inspections of the engine to determine its current operational state and to verify recorded faults and identify new faults. The engine is divided into separate inspection stations, and at each station the routines guide the mechanics through a 100-percent inspection of that region. Upon completion, an electronic DA Form 2404 with noted deficiencies is automatically generated. When deficiencies are noted, TED automatically links to pertinent sections of maintenance and repair parts modules.

Operational Checks. The second area under the TED module is the opera-

tional checks. The operational checks organize DS diagnostic logic by terms easily recognized by mechanics, regardless of experience. Troubleshooting areas include: No Start, Protective Modes, Low Power, High Oil/Smoke, Metal Generation, Quick Coast Down, Unscheduled Shutdown, Rapid Functional Assessment, Compressor Surge, Leak Checks, Pre-Operational Checks, and Operational Checks. Each of the 12 submodules contains diagnostic logic to first determine the cause of the faulty symptom, and once the cause has been detected, to link the appropriate maintenance and repair parts modules.

Maintenance Procedures. Maintenance actions for any component include adjust, repair, remove, and replace. The procedures can be invoked in either browse mode or data-driven mode. When in browse mode, maintenance procedures are manually selected through menus and submenus. This provides experienced mechanics the flexibility of viewing only the procedures that they need, while bypassing familiar or routine tasks. When in the data-driven mode, TED automatically establishes the correct links to all pertinent maintenance procedures and to sections of the repair parts manual.

Second Main Module—ABOB

The ABOB main module provides the mechanic an interface to the ABOB. Conceived and developed by Dr. Mark Kregel from ARL, the ABOB is an automated version of the Breakout Box (BOB), which is a diagnostic tool that is now in the field. Currently, mechanics must manually connect the BOB to the AGT-1500 electronic control unit. Once connected, mechanics must then manually read voltages and then manually calculate whether the readings represent a problem. This process is fraught with errors and is time consuming.

The ABOB automates the entire process because it is capable of reading 128 channels of data simultaneously. These signals are passed to TED through a standard serial port. ABOB can be used with or without TED to display voltages on the computer screen in either numerical or graphical format. The ABOB software automates the manual tasks associated with the BOB by providing instantaneous access to all of the engine's voltage signals. When TED is run with ABOB, signals can be automatically monitored, and when a fault occurs, mechanics will be notified of the problem within seconds instead of minutes.

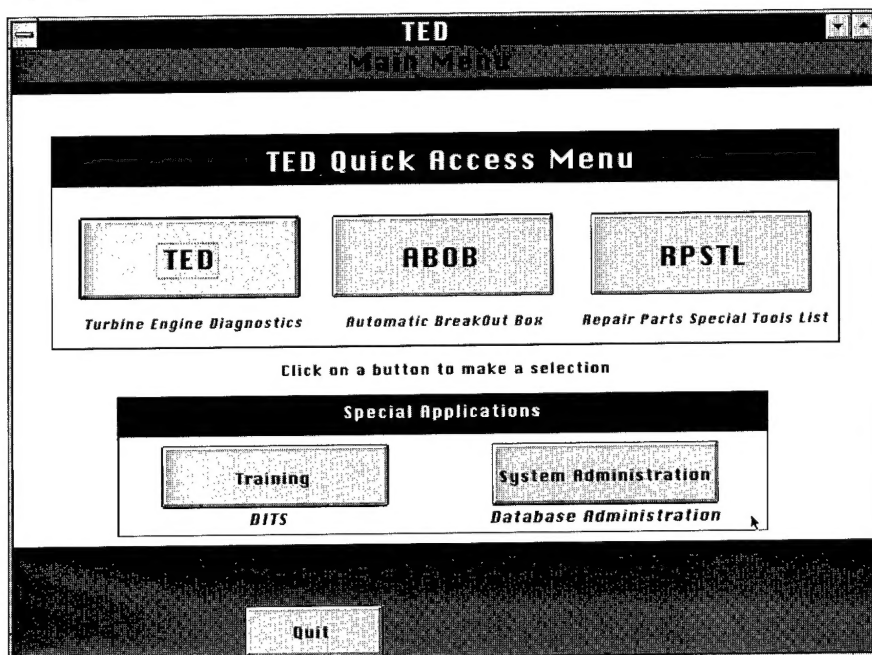


Figure 1. TED Main Menu

ABOB automates many of the diagnostic tests performed by the Simplified Test Equipment (STE). The STE was fielded in 1981 and is based on analog technology. Kregel is currently working on an advanced version of ABOB to automate STE functionality and reduce the number of manual tasks associated with STE.

Just as the 7-foot stack of paper manuals for the engine has been replaced by a single CD, ARL is extending the capabilities of the ABOB hardware and software to replace the set of seven huge trunks that house the STE.

Third Main Module—Repair Parts and Special Tools List (RPSTL)

The third main module of TED is the RPSTL module. This module greatly enhances the mechanic's ability to interrogate the parts ordering information for every aspect of the Abrams engine and transmission. The mechanic is provided the ability to search for items of interest in a variety of ways. In addition to being automatically linked from a diagnostic procedure, the mechanic can peruse the system from a general table of contents or choose to search for a specific part number, national stock number, or nomenclature.

Commenting on the importance of the RPSTL, one soldier put it this way: "Hey, I don't just find faults; I do more than that. And you're going to give me a computer that does this? Well, it isn't any good if I've still got to look it up in the tech manuals." Based on repetitive comments like this one, the team realized the importance of this reference tool. Said Helfman, "They [soldiers] wanted and needed it, so we threw in the RPSTL."

Figure 2 is a typical ordering selection form as it appears on the TED software. Its associated parts list is displayed on the right side, while its drawing is detailed on the left. Items are selected from the parts list by buttoning the particular order box. When necessary, portions of a drawing may be magnified to highlight areas of interest. Information from the RPSTL is automatically associated with its corresponding work order.

TED System Administration

The report writing and database maintenance functions enable the mechanic to automatically fill out and print DA Form 2404, Technical Inspection Form. In addition, TED provides numerous work order and statistical summaries. TED also permits online database maintenance procedures to

insure that data integrity is maintained.

Diagnostic Intelligent Tutoring System (DITS)—A Diagnostic Trainer to Complement TED

The DITS module is a stand-alone embedded tutorial system that employs Intelligent Computer-Aided Instructional technology⁴ to teach turbine engine diagnostics. DITS will determine the mechanic's level of expertise with troubleshooting procedures on the AGT-1500 Turbine Engine, level of troubleshooting experience and related knowledge, and preferred way of learning information. An adaptive program, DITS is designed to continually change its approach to presenting information as the mechanics begin to hone their diagnostic skills. It provides turbine engine mechanics with an automated capability to hone their diagnostic skills in both a field and garrison environment.

The DITS system consists of three separate modules: an introduction module, an AGT-1500 review module, and a diagnostics practice module. Besides a basic review in turbine engine maintenance procedures, DITS also provides the theory of turbine engine operations, and guidance on such tasks as hooking up the GHSS, using a digital multimeter, and accessing an online Windows tutorial. The DITS student aid section contains a notepad (for student notes), a glossary of frequently used terms, and a bookmark feature.

In addition, DITS is designed to be personalized, and each mechanic's session is keyed to a first-name entry system. DITS will automatically file and categorize each session by the mechanic's first name—and remind that same mechanic, once logged on the system, of the last session. Serving as both a diagnostic trainer and a diagnostic tool, DITS complements TED by providing mechanics a complete system.

Lessons Learned

Of the major lessons learned on the TED program, perhaps the one that

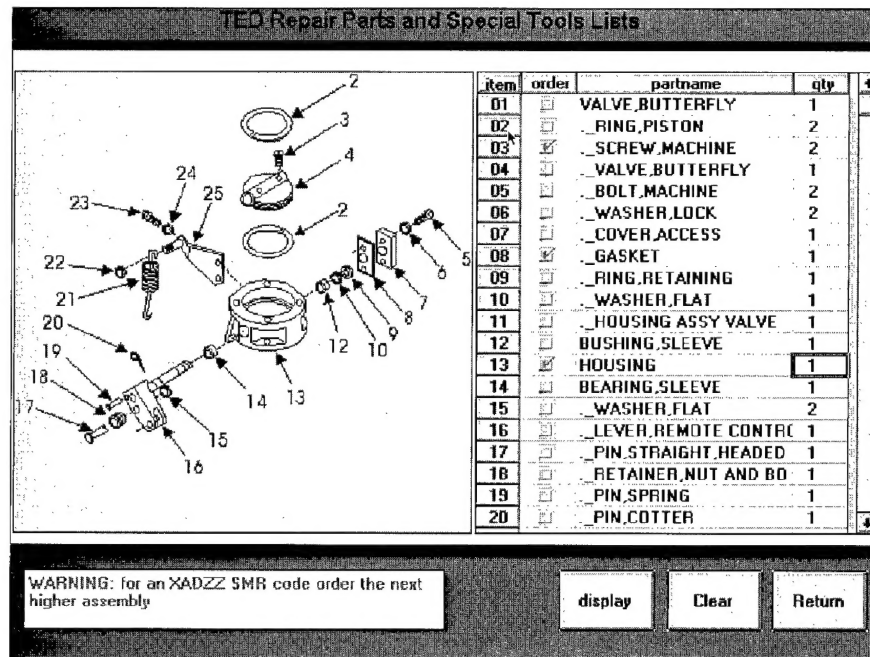


Figure 2. TED Repair Parts and Special Tools Lists

FORERUNNERS OF ACQUISITION REFORM?

Several years ago, country western singer Barbara Mandrell popularized a song called "I Was Country When Country Wasn't Cool." In much the same way, that analogy describes the TED team, who were practicing key strategies of acquisition reform before they were institutionalized as the DoD's preferred way of doing business: Integrated Product Teams (IPT) and Advanced Concept Technology Demonstrations (ACTD). From the start, teamwork and cooperation were paramount. Concentrating on building an executable strategy, the team purposely identified and resolved issues as they arose. Focusing on cost control, they kept documentation to the necessary minimum; reported through the chain of command, as necessary; streamlined the decision process; and, where possible, reduced infrastructure. In a nutshell, they practiced the main tenets of IPTs: decide, promulgate, train, communicate, and implement.

Likewise, the team actively engaged in ACTDs during the entire life of the project. The user, at the start of a project, can rarely envision how technology can improve his or her job. A system based on initial user expectations will at best be shallow and may even be useless. The TED team adopted a soldier-centric paradigm that emphasized *support* rather than *supplant* as the end product. This method of open communication better enabled the team to leverage the experience of the SMEs while ensuring continuous soldier feedback during the incremental development. As a result, early prototypes gained quick acceptance and greatly added to the momentum of the program.

In the early years of the project, TED software modules were tested weekly using students in the Army Ordnance Center and School (OC&S). After the first formal test in August 1993, the need for testing was relaxed and is now done once a month using students from the OC&S. Additional user feedback is also provided monthly from the National Guard units that have received TED.

According to Dr. Richard Helfman, TED lead scientist and programmer, "Feedback from users may lead to small easy changes to the system, or may even lead to new system features or new software modules."

stands out, according to the project director and program manager, is the realization that software-intensive programs require an incremental management approach whereby successive prototypes are developed that refine user requirements and integrate emerging technology. The corollary to this is the realization that the user must be the foremost member of the development team. In addition, the TED team realized that an integrated product team approach produced the best results (see Forerunners of Acquisition Reform, left column).

Find the Right Life-Cycle Model for Your Program. The traditional software life-cycle management model, also referred to as the waterfall method, emphasizes a systematic approach of dividing software development into exact stages. Each subsequent stage is predicated upon completion of the previous stage, hence the reference to a waterfall. However, this paradigm is not conducive to rapidly changing user requirements and the rapid rise of technology improvements.

TED development required an incremental life-cycle management system that enabled the team to rapidly develop prototypes consisting of individual modules that could be used separately or in conjunction with the parent program, test their applicability, and integrate their functionality. The traditional waterfall software development model did not allow for this flexibility. Hence, the team determined that a more responsive development paradigm had to be used in order to promote incremental development through the use of rapid prototyping. After searching for an answer, the team decided to employ the Rand Expert System Life Cycle Process Model.

Rand's *Management of Expert Systems Development Guide*⁵ advocates a risk-driven approach to expert system development that enhances the likelihood of success through early recognition of potential problem areas in program cost, schedule, and perfor-

mance. The Rand development paradigm consists of six separate and distinct phases: Initiation (Milestone 0), Concept (Milestone I), Definition/Design (Milestone II), Development (Milestone III), Deployment (Milestone IV) and Post-Deployment. Each phase is roughly equivalent to the classic Life Cycle System Management Model. However, the basic difference is that each phase of the Rand paradigm produces a distinctive prototype that serves as the de facto exit criteria to move from that particular phase to the next. The prototypes are continually refined throughout the Rand Expert System Life Cycle based upon the results of continual user testing as well as the insertion of emerging technological innovations.

Referring to user reaction, Illi commented, "Rick [Helfman] and I decided to employ the Rand Model... because it allowed us the flexibility to use a series of successive prototypes to explore user reaction and incrementally improve system functionality. In essence, it allowed us to determine that if a prototype works, then we can build on it. If it doesn't work, then we stop, go back, and rebuild that specific prototype."

As was mentioned at the onset of this article, an operational prototype version (Version 1.3) of TED is currently being tested at 65 Army National Guard Regional Maintenance Sites across the United States. The National Guard provided the TED team with an opportunity to continually evaluate TED performance in an operational environment. Based on these field evaluations, the TED team routinely tests new modules and incorporates recommended changes, based upon input from these extended field tests.

Soldier-centric. This phrase was initially coined by Timothy Hanratty and refers to yet another major lesson learned. Actually, it may be more appropriately labeled a sound, joint programmatic decision made by both Helfman and Illi at the onset of the

program—a decision that proved its worth many times over.

Actively involving the soldier—the ultimate end user—in TED's development from the start proved to be the life blood of the program. According to Helfman, "I strongly believe that if you want to build something that a soldier will use, you must live with the soldier from the first day of the process."

Programmers and SMEs do not speak the same language. Programmers talk of frames, objects, and Source Lines of Code (SLOC). M1 mechanics talk of Inlet Guide Vane angles, and of Rotational Variable Differential Transformers. Each needs to learn some of the other's language, but TED's main effort was to have the programmer learn the language of the mechanic.

The team decided the best way to do this is to observe the user in his or her environment. As a starting point, they attended and videotaped classes for M1 mechanics. This produced three important benefits.

- First, it quickly immersed the programmers into the language of the mechanic. The Inlet Guide Vane is right in front of the engine, and the angle determines how much air gets through to the turbine blades.
- Second, it gave an accurate picture of how a mechanic performs his or her job, and how software might improve that job. The TED team noticed during the first session that the original scope of work was too narrow. There was a whole suite of software that could help the mechanic better perform his or her job.
- Third, it established a bond between programmer and soldier. Soldiers could sense that the team was serious and that soldier's needs would be given serious attention. They were thus eager to cooperate.

When the aim is to produce software that not only works as planned, but also gets used by the mechanic, then user participation in the development

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process is critical. The TED team heard many stories from soldiers about equipment that never gets used and about equipment that is difficult to use, for which a small change would have made the item soldier-friendly. The TED SMEs were assigned full time to the project.

Helfman readily admits that when the team started the program, they pretty much thought they could do it themselves. "We're programmers, so that's what we're good at. And the Ordnance School basically fixes tanks; that's what they're good at. We quickly learned that if we work together, it really works great...That's when we organized into a cohesive and cooperative team...We knew that it was so inherently difficult to do that nobody could do it alone."

Illi affirmed his assessment, stating that "It was a sobering experience for all sides. For ARL, because they knew they couldn't do it without the soldiers. For the soldiers, they knew they couldn't do it without ARL. For me,

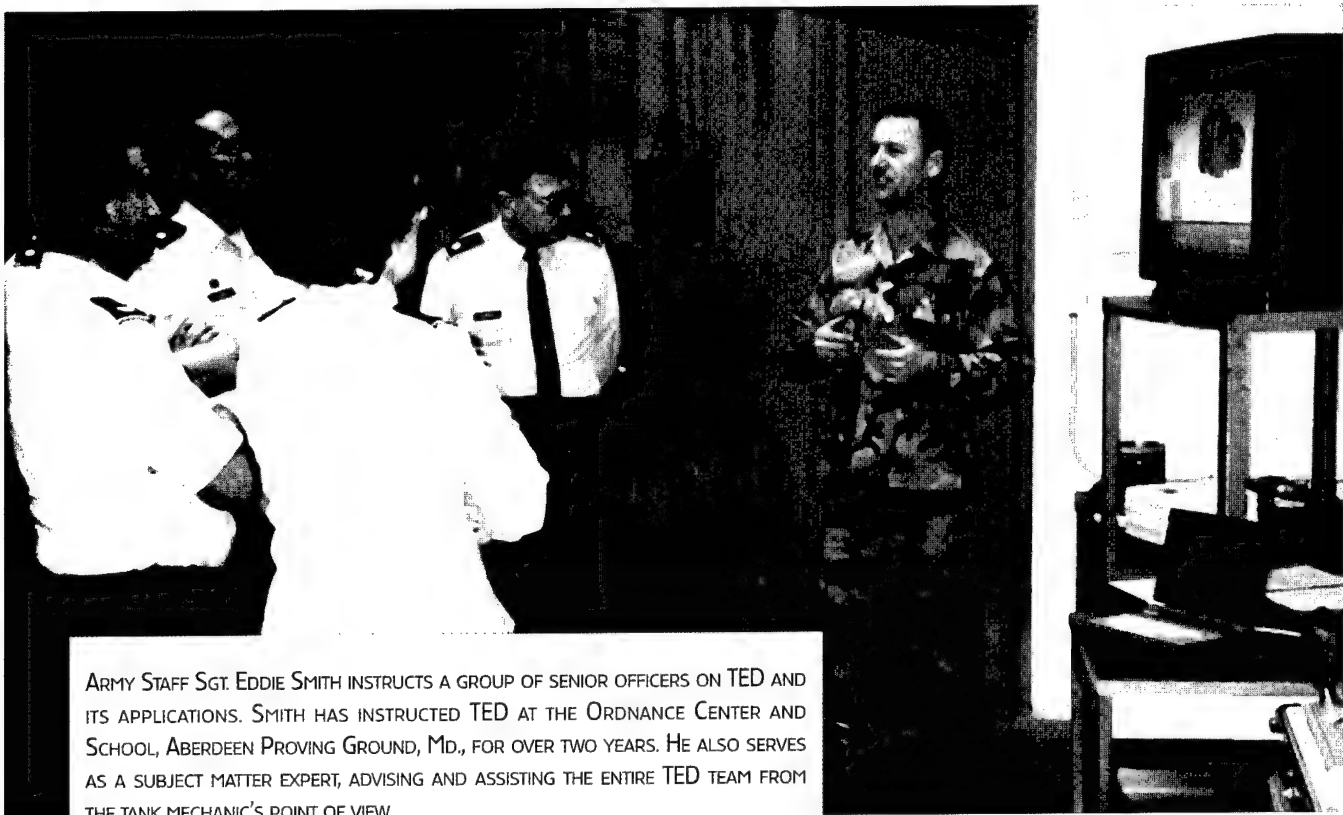
charged with trying to pull this whole thing together because we knew that we all were going to sink or swim together—that no one group was more important than the other."

Holly Ingham, who is currently working on the TED program as a computer scientist, also spoke of the importance of not trying to go it alone. "This field of artificial intelligence is growing by leaps and bounds. I think back in '91 it was probably breaking a lot of new ground. I'm currently taking an artificial intelligence class now in graduate school and they're telling me, 'You can't develop an expert system without a marriage between the expert and the programmer.' And the TED team learned that early on. Now it's coming out in school—yes, that's the only common sense way to make an expert system."

John Dumer, a computer scientist and TED programmer, also described the team's soldier-centric strategy as the most common-sense approach. "You're marrying programmers with subject matter experts, and you're finding that least common denominator, which was the soldier, that we wanted to develop this software for. And if you keep the soldier in mind the whole time—is this good for the soldier—it all made sense."

Risktaking. Perhaps the most painful lesson learned by Illi and the team involved risktaking. "You have to be willing to take hits," said Illi, "and do total revamps of the software when you find out that you're going in the wrong direction. Hopefully, you catch it early on. But if you don't, you still have to be willing to take the hit, go back, and do it right."

Citing a specific example, Illi talked about the early days of the project. "One of the things I learned the hard way, is that you have to be able to accept that you're going to fail. Because four months into the project we had to completely change our primary expert system authoring software...We had to abandon a rule-based



ARMY STAFF SGT. EDDIE SMITH INSTRUCTS A GROUP OF SENIOR OFFICERS ON TED AND ITS APPLICATIONS. SMITH HAS INSTRUCTED TED AT THE ORDNANCE CENTER AND SCHOOL, ABERDEEN PROVING GROUND, MD., FOR OVER TWO YEARS. HE ALSO SERVES AS A SUBJECT MATTER EXPERT, ADVISING AND ASSISTING THE ENTIRE TED TEAM FROM THE TANK MECHANIC'S POINT OF VIEW.

system that we learned very early on simply wasn't going to work." As program manager, it fell to Illi, to consider the ramifications of whether to continue the program with the original authoring software, knowing that it had a high probability of failure; or to take the hit now, and rework the concept prototype—a decision that would result in a six-month program delay. Given the importance of the project, he advised his superiors to take the hit now and rework the concept prototype. Both Illi and the program survived—a tribute to the Ordnance School leadership who were tolerant of failure in the face of reasoned risktaking.

Speaking of risktaking in an acquisition culture that was, by its very nature, inevitably risk-averse, Illi said that "We took a lot of risks; the field of Artificial Intelligence is a risk-laden arena. There is a lot of theory on how to develop an operational expert system, but very few examples of how to get there. So if you looked at it from the standpoint of whether or not all the risks were warranted, I can only

conclude that, yes, at the time they were."

Both Helfman and Illi spoke of how the team, when it was determined that the original software choice was clearly not going to work, evaluated a newly formed company that was literally unknown by anyone outside of the artificial intelligence community. Because the team liked and respected their product, they flew to Washington state and visited this small company on-site. Helfman remembers, "We convinced ourselves that these guys were going to be in business for the length that we needed them to complete the project, so we said, 'You know, we like your product; we think it's great.' But we wanted some features that they didn't have. So we asked, 'How much will it cost to add these features?' When they told us about \$50,000, we said, 'When can we have it?' You know, we were getting delivery of the product within a matter of months."

"That," Illi continued, "was probably the greatest single risk that we took, because the program was dead in the

water; I had to make a call, based upon an 80-percent solution set. The main program management lesson that I learned is that you are never going to have all the data you need to make a decision. The program manager has to be willing to take the risk. *If you're going to stay in a comfort zone, then you're not going to field the system.*"

The new software, *Visual Expert*, by SOFTSELL™, provided a significant improvement over the existing authoring system, was user-friendly in that the frame-based reasoning actually replicated the way the team's head SME, Army Master Sgt. Ralph Ishman, actually diagnosed problems. He literally sat down at the computer and gave the team his ideas on the way the logic flow should work—not based upon the current TMs, but based upon his heuristics or rules of thumb, developed through years of operational experience. These heuristics, were the backbone of TED. *Visual Expert* allowed Ishman to capture them in a concise manner.

Ishman, now retired and working for a private trucking firm, reflected on his

tenure working as the primary SME for TED from 1991 through 1996: "TED was a tool for the soldiers. It was a matter of bringing the soldier who did not have access to computerized equipment, into the information age. My main objective was to fit the software to the soldier in the field, like me, who had never used a computer. As a mechanic, I wanted to see the programmers build the computer program for the soldiers, not the scientists. I wanted it to include 'real life' applications and be a tool for them to use just as they would any tech manual or tool—not just a computer screen. And it worked. Many of the soldiers using it for the first time actually did not realize they were using a computer." Ishman, even in retirement, remains an invaluable member of the team, such that he still gets calls from time to time, asking for his opinions or assessments.

As an aside, the U.S. Naval Post Graduate School has employed the same software-based upon recommendations from the TED team—to construct an expert system for diagnostics on the Mark 92 radar.

Leveraging Commercial Off-the-Shelf (COTS) Software

Another important lesson learned, according to Helfman, was the fact that "You can't do a big project in one package...you may need up to a dozen different software packages." Early into the TED project, the team decided that time was better spent on knowledge acquisition and testing than on pure code development. As a result, COTS software was leveraged whenever and wherever applicable. COTS products provided the high quality, lower cost, and added flexibility the project required. The TED team capitalized on the COTS products of *Visual Expert*, *Visual Basic*, *Access*, *Toolbook*, and *HyperWriter*. In-house code was developed using Microsoft C++ and Borland's Delphi languages.

Adoption of the COTS approach complemented the team's rapid prototyping life cycle and soldier-centric

beliefs. Solutions to hardware and software problems were changed or altered component by component without adversely affecting the whole. In the early years of the project, the team tested the software at least weekly, using students in the Ordnance School. Feedback from the users led to changes, ranging from small modifications to the addition of new system features. With COTS, the ability to identify and rapidly install emerging technologies was made easier. After the first formal test in August 1993, the need for testing was relaxed and is now done once a month. Primary feedback now comes from the Ordnance School and National Guard units that have received TED.

Noting that you can't have the good with the bad, Helfman reminds us there is a downside to COTS that must be remembered: "Each package has its own features, but they all must work together. That's usually where the problems surface: packages communicating with packages." Purchasing COTS products has to be approached with caution. Careful consideration must be given to correctly match system requirements to the potential COTS product's model. Not only does the COTS product have to adequately match the functional requirements of your environment, it must match the operational requirements as well. Incorrect matching can lead to expensive change orders that eliminate any potential cost and time savings. Additionally, legal distribution and software copyrights need to be weighed when dealing with COTS products. A product purchased without unlimited distribution rights can prove quite prohibitive. Today, the team continues to track the latest software and hardware trends, actively looking for yet other system improvements.

What Do We Gain?

Subsequent to the fielding of the Operational Prototype to the National Guard, a trend toward maintenance cost savings began to emerge. According to Helfman, "Essentially, rather than randomly replacing parts on the

engine until it starts working again, which was the old way, the system walked the soldier through a more methodical approach, a higher percentage of hitting the defective part the first time."

The goal of the TED program is to save money by reducing the diagnostic error rate. An 80-percent error reduction will save roughly \$8 million each year by avoiding unneeded repair. The TED program is on its way to achieving this goal.

- In 1993, the University of Delaware conducted a formal user test using 30 soldiers from the Tennessee National Guard. The results showed that TED cut the error rate by 50 percent.
- In the summer of 1994, units from two different state National Guards received early versions of the TED software. Each state had three broken engines slated for turn-in. Each state had diagnosed the bad engines before TED arrived. On Saturday, July 9, TED was used on the three engines from one state, and on Sunday, July 10, on the three engines from the other state. Of all six engines, the pre-TED diagnosis was wrong, and the TED diagnosis was right. Thus, in the first two days of fielding, TED saved the Guard six incorrect engine repairs at a cost savings of over \$50K.
- By summer of 1996, ABOB diagnostics had error rates well below 5 percent.

Training/Proficiency. Successful development and fielding of TED will increase the effectiveness of ordnance soldiers. TED, by virtue of its modular design and its embedded tutorial program, preserves and encodes mechanics' rules-of-thumb or heuristics that are employed routinely in daily maintenance operations, but are lost when personnel are transferred or leave the service. Once these heuristics are incorporated in TED, they are codified and can be passed on to novice and apprentice mechanics, thus improving their training and daily proficiency.

TED TEAM WINS AWARD

TED Team Wins ADPA Logistics Artificial Intelligence Applications Award

On March 9, 1993, retired Maj. Gen. William E. Eicher, Vice President, American Defense Preparedness Association, presented ADPA's Logistics Artificial Intelligence Applications Award for 1993 to Army Lt. Col. Orlando J. Illi, Jr., and the members of the original TED team: Drs. Richard Helfman and Mark Kregel; John Durner; Capts. Janet Palfrey, Sherman Charles, and Mark Malham; Chief Warrant Officer Charles Ortt, Sr.; and Army Master Sgt. Ralph Ishman.

In 1994, the TED team, with the addition of representation from Pacific Northwest National Labs (PNNL), was again nominated for the same award for their pioneering work in the field of Prognostics. The nominated program—TEDANN (Turbine Engine Diagnostic Artificial Neural Net)—is currently undergoing advanced development at PNNL under the sponsorship of the U.S. Army Logistics Integration Agency and the U.S. Army Artificial Intelligence Center. The renomination was highly unusual in that the same team was nominated for the same award, two successive years.

In addition, TED routinely provides both the user and mechanic with real-time system assessments. This capability will necessarily reduce Preventive Maintenance and Checks System requirements as systems are designed to monitor their own performance parameters.

Soldiers consistently prefer TED to attain training and proficiency. "We've had folks tell us that they like to come to work when they can use TED," said Helfman. "You know, that certainly was never part of our scope, but they tell us 'Hey, if I come in and I get to work on an engine and get to use TED, that's a happy day. If I have to go and work on something else and use the manuals, it's not a happy day.' So it's had a secondary effect of enhancing morale, which I think if you could quantify it, is very important."

The Ordnance School places such confidence in TED that they have published a TED User Manual and are teaching TED to their basic and advanced NCO courses as well as their maintenance warrant officer courses.

What's Ahead?

The first obvious extension to the TED project involves the creation of a TED associate. Identified as a possible candidate to capitalize on TED's model of maintenance is the U.S. Army's Bradley Fighting Vehicle (BFV). Similar to the Abrams MBT, the BFV has its

own special maintenance issues. Toward this end, the National Guard Bureau has shown increasingly strong interest and continues its pursuit.

A second possible direction for consideration includes extending the TED project into the turret systems of the Abrams tank. Strong arguments have been made that ABOB technology would improve the efficiency and effectiveness of turret diagnostics.

Still a third logical extension of TED is the premise that expert diagnostic systems can be developed to predict when a part will fail. This concept, referred to as prognostics, was first envisioned by Illi in 1993. At that time, he assembled a team consisting of representatives from Pacific Northwest National Laboratories, ARL, and the Ordnance School to explore this concept. The program, referred to as TEDANN (Turbine Engine Diagnostic Artificial Neural Net), successfully demonstrated that a neural net could be constructed to perform prognostics on a turbine engine. The technology inherent in TEDANN was judged to be of sufficient merit to be nominated for the 1994 ADPA Logistics Artificial Intelligence Award. After Illi's retirement, the TEDANN project was continued by Army Lt. Col. Steve Barth, at the U.S. Army Logistics Integration Agency (LIA). Barth gives us this update on the TEDANN program.



ORIGINAL TED TEAM AS THEY RECEIVED THE 1993 ADPA LOGISTICS ARTIFICIAL INTELLIGENCE APPLICATIONS AWARD.

"The Logistics Integration Agency is pursuing the development of an operational prototype of the TEDANN as a proof of principle for Army-wide application across a wide spectrum of vehicle platforms. The potential of an artificial intelligence application like neural nets provides the field commander with a reliable predictive maintenance capability to forecast "down time." TED was selected as the developmental candidate because of its mature nature as an Interactive Electronic Technical Manual (IETM).

Presently, TED is used by mechanics after failure of the AGT-1500 engine to diagnose the repairs needed to return it to operational readiness. By hooking in through a databus connection on the engine, TED functions as a "tool" for the mechanic by troubleshooting the associated sub-systems of the engine and isolating the faults through sensors embedded in the engine. This diagnostic capability is a tremendous aid in identifying faults; unfortunately, diagnosis occurs after a failure. Often this failure is catastrophic, but always inconvenient.

TEDANN will (1) monitor the same sensors while in operation; (2) "learn" from previous failures (by tracking the patterns that led to failure); and (3) predict the time and likelihood of the next failure. Applied across the spectrum of weapons platforms and used with IETMs found in a task force, artificial neural nets could predict the availability of systems for the next fight or the duration of a task force deployment.

In pursuit of TEDANN, LIA is currently negotiating the site for the TEDANN development of the baseline of sensor readings to begin to build the "learning" database. Under consideration for test vehicles are M1A1s within the Washington or Oregon National Guard, test vehicles at Yuma Proving Grounds, and M1A1s within the rotational fleets supporting the National Training Center at Fort Irwin, Calif. Selection of the fleet and the concept supporting the collection of the sensor

readings will not be finalized until approval by LIA and PM M1A1."

Bottom Line—Soldier Acceptance

The entire TED team is excited about the degree of soldier acceptance since onset of the program. Said Helfman, "The Marine Corps and virtually everyone that comes here [ARL], everyone that sees it, is excited about it. Most want the system right away. They are going to get it, but it's a few years downstream." The team is constantly surprised when they travel, that soldiers not only know about TED before they get there, but are more than anxious to get it. Soldier acceptance, however, is portrayed best by the TED project director's measure of success:

"My measure of effectiveness is the smiles we see on the soldiers' faces."

—Dr. Rick Helfman

Editor's Note: As part of my research for this article, I attended a TED Demo, which was given by Army Staff Sgt. Eddie Smith to a group of basic noncommissioned officer students (E-5) at the Army Ordnance Center and School. The class had heard of TED, but had never seen the TED software in action. Helfman's measure of success is accurate—I saw the smiles and looks of amazement on the soldiers' faces; they were eager to ask questions, and eager to test it out. If soldiers' reactions are any sort of gauge, it looks as though the Army has itself a winner.

About the team: The team members are Baur, Dumer, Hanratty, Helfman, and Ingham. They are assigned to the Intelligent Systems and Technology (IS&T) Directorate, ARL, as computer scientists and TED programmers. Dumer, Hanratty, and Helfman are part of the original TED development team. Baur and Ingham joined midway. Helfman was the original lead scientist on the TED program. He is currently TED project director. Smith is a noncommissioned officer and TED instructor, assigned to the Ordnance

School. He also serves as the TED subject matter expert, advising the team from the soldier's point of view. Kregel is a retired ARL scientist who designed and built the ABOB. He is under contract to the ARL to expand the ABOB's capabilities. Illi is a retired Army lieutenant colonel, and original project manager for development of the Turbine Engine Diagnostics system or TED. Prior to his retirement, he served as the Director of Automation at the Defense Systems Management College. He is currently employed by Systems Research and Applications International, Inc., as a senior member of their professional staff, responsible for managing the Medical Advanced Technology Management Office Knowledge Engineering Group, at the U.S. Army Medical Research and Development Command, Fort Detrick, Md.

For further information Helfman suggests users access TED's Home Page on the Internet:

<http://www.arl.mil/ARL-Directories/ASHPC/SISD/ted.html>

He also encourages users to send him an E-mail with any comments, suggestions, or questions:

helfman@arl.army.mil

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SECDEF and DAE Jump Start Acquisition Reform Week at Pentagon Press Conference

March 14, 1997

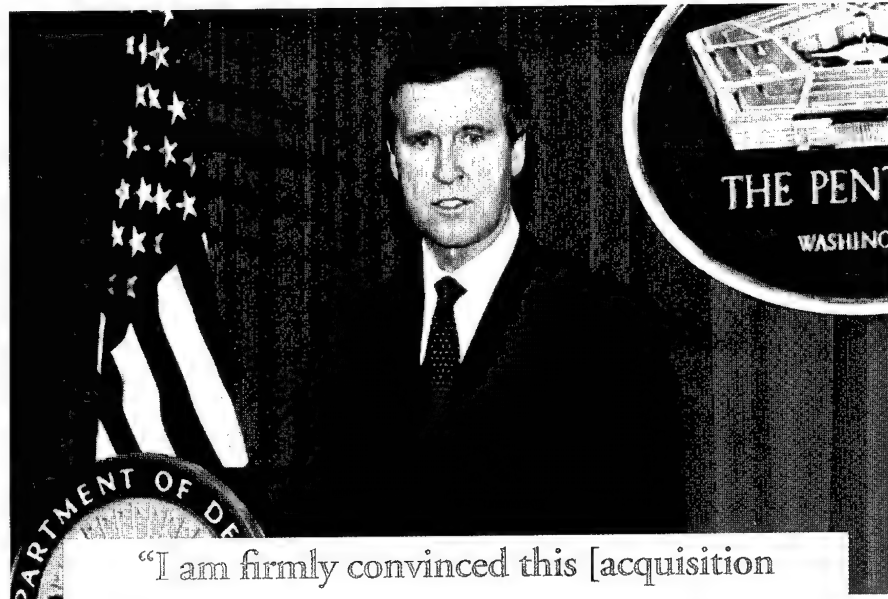
Editor's Note: Secretary of Defense William S. Cohen and Under Secretary of Defense for Acquisition and Technology, Dr. Paul G. Kaminski, held a joint DoD briefing as a prelude to Acquisition Reform Week, March 17-21, 1997. *Program Manager* is pleased to publish key excerpts for the benefit of our readers.

Secretary Cohen's Remarks

I'm here today to help kick off Acquisition Reform Week, because I want to stress how important this subject matter is to me and what priority I place on it. It's important to the public, it's important to the Congress, suppliers, managers, workforce, and most especially, the troops.

Walter Lipman wrote an essay how he described where dramatic change occurs in the following fashion. He said, "A regime and established order is rarely overthrown by a revolutionary movement. Usually a regime collapses of its own weakness, and then a revolutionary movement enters among the ruins and takes over the powers that have become vacant."

I think that statement accurately portrays the status of our defense acquisition system, at least in the past, because for years it has been sliding of its own weight and weakness into a state of collapse. Suppliers have been shackled by overly prescriptive specifications and purchasing rules. I recall being in the Senate holding up 14 pages of regulations describing a cookie—what would qualify for an adequate cookie for the military. Buyers have been bound up by senseless red



"I am firmly convinced this [acquisition reform] is absolutely critical to our maintaining a strong military into the 21st Century. We have an obligation to pursue it aggressively, because the public deserves it. When the public sees how much is being wasted in our acquisition system, they become justifiably outraged. So the public demands it, so we have an obligation to provide it."

— William S. Cohen
Secretary of Defense

tape. And of course, when the taxpayers saw how much money was being wasted, they saw more than red tape, they saw red.

Today the revolutionary movement has entered among the ruins. The movement has been fomented by the imagination, the energy, and the perse-

verance of former Secretary of Defense Bill Perry. He is what I would call the Thomas Paine of Acquisition Reform. He's been supported, and I should say he's also been supported very strongly by, maybe Sir Galahad, in the form of Paul Kaminski. Dr. Kaminski has been just an outstanding advocate for acquisition reform along with Gil Decker, Art Money, and John Douglass. These gentlemen have been in the forefront of acquisition reform in the Defense Department and have made an enormous contribution. It's been carried out by a very dedicated acquisition staff as well; much of it made possible by President Clinton and Vice President Gore, as far [as] reinventing government initiatives, and also by legislation adopted by Congress.

I'm pleased to say that during my years on Capitol Hill that I did play a role in the shaping of at least three pieces of legislation, three major pieces of legislation—the Federal Acquisition Reform Act, the Competition in Contracting Act, and most recently, the Information Technology Management Act. Having helped spark that revolution, I now intend to see it through as Secretary of Defense. That's a pledge—as being one of my top priorities.

I am firmly convinced this is absolutely critical to our maintaining a strong military into the 21st Century. We have an obligation to pursue it aggressively, because the public deserves it. When the public sees how much is being wasted in our acquisition system, they become justifiably outraged. So the public demands it, so we have an obligation to provide it.

We have an opportunity for reform because the marketplace is now providing it. The revolution in commercial technology and business practices has made us a global economic power. It also will help to sustain us as a global military power.

We have an urgency to reform it, because reality demands it. That reality is, that absent any kind of a major conflict in the world, our budgets are

likely to remain flat. But the fact is that our troops need new equipment to sustain the technological edge that we have, and therefore, more modernization money has to go into product and not into process.

The reality is that we're living in an era of very fast-paced change in technology and also in world events, so we need fast-paced acquisition systems that can seize upon the new technologies that are being developed that will enable our forces to respond to the exigencies of the moment.

Having the greatest and the most powerful forces in the world, we can prevail on any battlefield. We cannot, however, see over the horizon with any degree of clarity and precision. So we need business practices that can respond quickly, flexibly, cost effectively, in whatever comes over the horizon. In other words, we need an acquisition system that can quickly tap into the commercial marketplace for new technology, that can apply that new technology to new systems, but also to existing systems, to upgrade that combat capability. We need to quickly put this technology into the warfighters' hands to meet their needs while this technology is still new and very competitive.

So if we're successful, we're going to be positioned to meet those challenges that come over the horizon in whatever form they come. Already I think we can see some rather significant progress in this fast-paced acquisition system. We've seen the results in Bosnia. We are now using commercial computer equipment to download intelligence from commercial satellites in encrypted form. We also saw it in Bosnia with the monitoring of the peace process there, using the Predator UAV. That is among our first advanced concept technology demonstrators, and this, of course, develops and fine tunes new systems and the training and the tactics for their use.

Monday I'm going to get another glimpse into this acquisition revolu-

tion at the National Training Center at Fort Irwin in Calif. There, the Army is field testing Force XXI, a digitized maneuver brigade that's been developed through an integrated team process. That team includes everyone who has a stake in the final product: the contractor, the doctrine developers, the testers, evaluators, as well as the end users—ultimately the warfighters. And together, that team is developing the technology, but they're also going beyond simply developing the technology. They're also working the tactics and the training which used to be done after a system was fielded in the past. We're now doing it ahead of time.

So we're yielding a better system. It's at a better price, at a faster pace with better performance for the troops.

So it's very nice for me to be able to step in as Secretary of Defense to acquisition reform that's so far along in the process, but I also know that the greatest amount of work lies ahead. It's much easier to start a revolution than to establish a new order—not a new world order, but a new order as far as acquisition is concerned.

So the challenge really is to apply these new practices to all of our programs across the board—large and small. And we have to make acquisition reform a part of our everyday life. And we have to continue to develop an acquisition workforce, and that's also a challenge because they need to have the skills and the tools along with the motivation. Once we institutionalize this reform, we can truly say that the revolution has become successful and that we've turned the world upside down for the better.

Now I'd like to invite Paul Kaminski to talk about acquisition reform and Acquisition Reform Week.

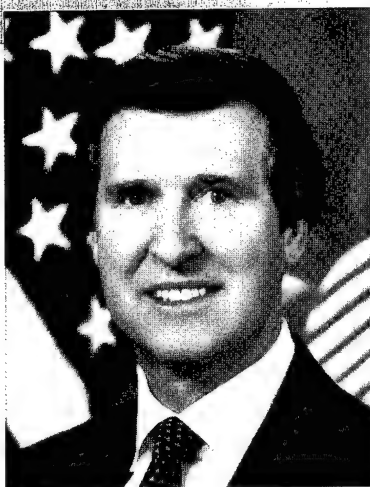
Dr. Kaminski's Remarks

I believe we've come a long way now in acquisition reform. As Secretary Cohen said, we not only want to sus-

WILLIAM S. COHEN

Secretary of Defense

William S. Cohen was sworn in as the 20th Secretary of Defense on January 24, 1997, following a unanimous vote by the Senate. Cohen previously served three terms in the U.S. Senate from the State of Maine (1979-1997) and three terms in the House of Representatives from Maine's Second Congressional District (1973-1979). He served on the Senate Armed Services and Governmental Affairs Committees from 1979-97. He was a member of the Senate Select Committee on Intelligence from 1983-91 and 1995-97, serving as Vice Chairman from 1987-91.



As a U.S. Senator, Cohen helped create the modern national security command structure by playing a leading role in crafting the Goldwater-Nichols Defense Reorganization Act of 1986. He co-authored legislation to overhaul U.S. counterintelligence and improve congressional oversight of all intelligence activities. He was also a leading advocate for veterans' education programs, sponsoring the 1984 GI Bill.

In recognition of his work on behalf of U.S. national security and military personnel, in 1996 Cohen received the U.S. Special Operations Command Medal; in 1983 he received the L. Mendel Rivers Award from the Noncommissioned Officers Association; and in 1980 he received the organization's "Vanguard" award.

Cohen has also been in the forefront of reforming the Federal Government's procurement process and of bringing accountability and private sector "best practices" to government agencies, including the Department of Defense. He authored the Competition in Contracting Act of 1984, the Information Technology Management Reform Act of 1986, and played a key role in drafting the Federal Acquisition Reform Act of 1996.

Throughout his career, Cohen has demonstrated leadership in U.S. foreign policy matters. He served on the board of directors of the Council on Foreign Relations from 1989-1997, chairing its Middle East Study Group. He also chaired and served on groups at the Center for Strategic and International Studies, the School for Advanced International Studies at Johns Hopkins University, and the Brookings Institution on issues including DoD reorganization, NATO enlargement, and chemical weapons arms control. Since 1985, Cohen has led the American delegation to the Munich Conference on Security Policy, which brings together senior officials from NATO and Partnership for Peace countries. He also led American delegations to the American-Arab Dialogue in Cairo and the Pacific Dialogue in Kuala Lumpur—both regional conferences on security and economic issues.

Cohen was born August 28, 1940, in Bangor, Maine. He attended Bangor High School graduating in 1958. He received his B.A. in Latin from Bowdoin College in 1962, and his LL.B. cum laude from Boston University Law School in 1965.

Cohen has authored or co-authored eight books, including two books of poetry, three novels, and three works of non-fiction.

His wife, Janet Langhart, is president of Langhart Communications. Cohen has two sons, Kevin and Chris.

tain the momentum that we've built here over the past few years, but we want to move out full speed ahead to institutionalize this base throughout the whole department.

A good way to characterize the status of our acquisition reform efforts is to sort of compare ourselves with a runner today. That runner is just beginning the third lap of what I view to be at least a four-lap race. We're well into the race, but I think there's still much more to do.

Reforming DoD's acquisition system is really one of the principal reasons that I signed on to be the Department's Defense Acquisition Executive. Lasting acquisition reform means a commitment to a continuous process of improving a system which has been built now over the last 50 years. Our vision here is to be the smartest, most efficient, most responsive buyer of best-value goods and services to meet our warfighters' needs.

Today our defense acquisition system is not undergoing just a reform, but I think Secretary Cohen used the right word—this is a really wholesale revolution of how the Department is doing business.

We've set aside next week as Acquisition Reform Week to pull together our government/industry teams throughout the defense acquisition system to look at the way we're continuing to do business now, and to explore how we might improve the way we do business in the future. The major focus here is on teamwork and a reinvention of the process that we have underway.

Our success in pulling together and operating as a team with open communications and no surprises will in large part be the overall key, I believe, to our success. I want to talk about that and illustrate what's been done here.

I think together as a team we have to focus on getting and keeping our costs down. And we need to cut our acquisi-

tion cycle times—the time that’s required for us to conceive of, develop, and to field a system, and to field it ready for use. If we truly view cost as an independent variable, then our government contractor teams need to collectively agree on ways to incentivize cost reductions.

We in the government must be willing to trade off minor reductions and requirements for significant reductions in costs when those trades are available to us, and industry must work with us to identify such opportunities. I don’t think this will happen unless we’re all part of a team—from the warfighting operators and users, to the trainers and doctrine developers, to the testers and simulation experts, and finally, to the acquirers and our industry partners.

I’d like to share with you now where we’ve been and where we’re going in acquisition reform. I think it will form the basis for much of the top-down message that I and our senior leadership team will be communicating top-down to our workforce during the Acquisition Reform Week.

There are seven major focus areas which compose our work in acquisition reform. The first one, *supporting the warfighter*, is really building on this team concept that I was describing. It emphasizes that the warfighter is our customer in this system. We must work as a team with the warfighter involved to begin to visualize the



“As we get smaller, we need to become better. We need more emphasis on training, education, continuing education for our workforce. We are now moving to electronic-based centers using our integrated product teams and focusing on our tactical business concerns, our strategic visions, bringing the warfighter’s needs into this process with us.”

— **Dr. Paul G. Kaminski**
Under Secretary of Defense
(Acquisition & Technology)

requirements, the opportunities, and to field equipment that works in the field: field equipment that has the

training built into it and anticipates the doctrine and the tactical application of the system. It doesn’t wait for that to be developed after the system is fielded. The issues here really involve getting together all the stakeholders as part of this team.

The next area is *improving our acquisition business processes*. I’ve talked about a few of those with you in the past. This, again, involves the issue of teaming and looking to fundamentally attack our cycle times.

We’ve fundamentally reengineered how we’re buying things like cookies, food items, and pharmaceutical products. We’re now doing that a whole

Seven Major Focus Areas for DoD Acquisition Reform

Supporting the Warfighter

Improving Acquisition Business Processes

Reducing Weapon System Life-Cycle Costs

Incentivizing Program Stability

Implementing Statutory and Regulatory Reforms

Conducting Pilot Demonstrations

Managing the Acquisition Workforce

different way than we've done it in the past, really going to a commercial-virtual approach.

The issue of reducing *weapons system life-cycle costs* has become a bigger and bigger issue since 60 to 70 percent of the life-cycle costs of our weapon systems occur after fielding. It is something we need to be giving more and more attention to.

We have launched the commercial O&S savings initiative (COSSI)—the dual use applications initiative that I briefed in a press conference in January. That program looks like it will be off to a very good start with very high bidder interest. Recall, that was a program in which we were looking to introduce commercially developed components into our fielded systems to reduce their life-cycle costs.

Incentivizing program stability remains one of our biggest problems today. It's probably the number one item on my list that needs continuing work in acquisition reform. Improving this is the item that can make still the greatest potential improvement in how we spend our money to deliver product.

Implementing statutory and regulatory reforms is an area where we have a wonderful base through the pieces of legislation that Secretary Cohen mentioned. Our issue here has been first to convert the legislation into regulation. That's all been done. Now our issues ahead are to make our workforce aware of the opportunities and to push this down into the entire system to raise the awareness of the freedom that our workers now have available to them—[it's] one of the major emphasis items in our Acquisition Reform Week, to push that down, to improve that awareness across the whole system.

The next item is *conducting pilot demonstrations*. These pilots give us an opportunity to pull together all the pieces of acquisition reform to illustrate what can really be done.

The last item I want to talk about is *managing our acquisition workforce*. In the end, our people are our most important asset, giving attention to not only downsizing that workforce, but making a better workforce. Better does have to go with smaller. That, too, is a major initiative in our Acquisition Reform Week.

Last year my sense was that we were not propagating the full message of acquisition reform to our entire workforce. To really institutionalize the good things that had been done, we really had to bring the workforce in with us—gainful exposure throughout the workforce—and be able to propagate the ideas and the opportunities throughout that workforce. So we stood down our acquisition workforce for one day, on the 31st of May in '96. That day exceeded my expectations.

On that day we established three lines of communication. A top-down, the sort of message I've been delivering to you today, but done by our whole leadership team in a much more thorough way. We allowed for a bottoms-up—a 90-day period for everybody in the field to get back to us: what was working, what wasn't working, what could we do better together. But probably the most interesting thing we did was to allow for a horizontal communication path—sharing of best practices with peers. I probably got more comments back on that issue than any other in terms of changing a culture: people being able to see how their better peers were performing and the results that came from that. So we're going to be wanting to do that in a big way.

We will be kicking this off next Monday, on March 17th. The kickoff will start with a very good tape that Vice President Gore has taken the time to make for our workforce. This is a big deal to him. He's put a lot of time and energies into his whole reinvention program, and this is part of it. Secretary Cohen will be taking the time to participate in that, as well as General Ralston and myself. This team concept

that I'm talking about will really be emphasized.

We will be recognizing excellence with the award of the Packard Award for Distinguished Performance in Acquisition. It's a key part of this horizontal communication that I was talking about to really change our culture, to recognize the opportunities. We will also be providing a set of awards for the best performance in the single process initiative that I was describing.

There will be a number of conferences through the week, a set of Internet opportunities, and a whole number of online forums which I would invite you to participate in. Many of those are open for your participation.

We look forward here to a really great week of getting this message top-down, bottom-up, and horizontally communicated through the whole process.

As I said, I think we have now really done substantial work to improve our acquisition process. I believe we are now really making fundamental changes to the environment and the culture. We still yet have a lot to do. As we get smaller, we need to become better. We need more emphasis on training, education, continuing education for our workforce. We are now moving to electronic-based centers using our integrated product teams and focusing on our tactical business concerns, our strategic visions, bringing the warfighter's needs into this process with us. And also looking fundamentally at the affordability of the systems. Cost is a big factor in this process.

Next week should be a very significant milestone week. It's not a stand-down week; that is, we're not standing down our whole force for a week. What we've done, though, is given the workforce freedom to pick days in this week to be able to concentrate and to be able to work around their own schedules with these forums and various activities going on through the whole week.

Kaminski Meets the Press

Q&A Session Highlights Successes, Difficulties of Implementing Acquisition Reform

Editor's Note: At a post-Press Conference Q&A Session following the joint SECDEF/DAE Pentagon Press Conference on March 14, 1997, Dr. Paul G. Kaminski, Under Secretary of Defense (Acquisition & Technology), fielded questions from the media. This article presents the questions and his responses.

Q

One of the things the building [Pentagon] has been working on is getting cost away from the economic order quantities of a buy. An example is the Lean Aircraft Initiative that's been going on. But on a grander scale, what are you doing toward getting there, and how effective can it actually ever be? Certainly, a munition you only buy two of can't be as cheap as one you buy 40,000 of.

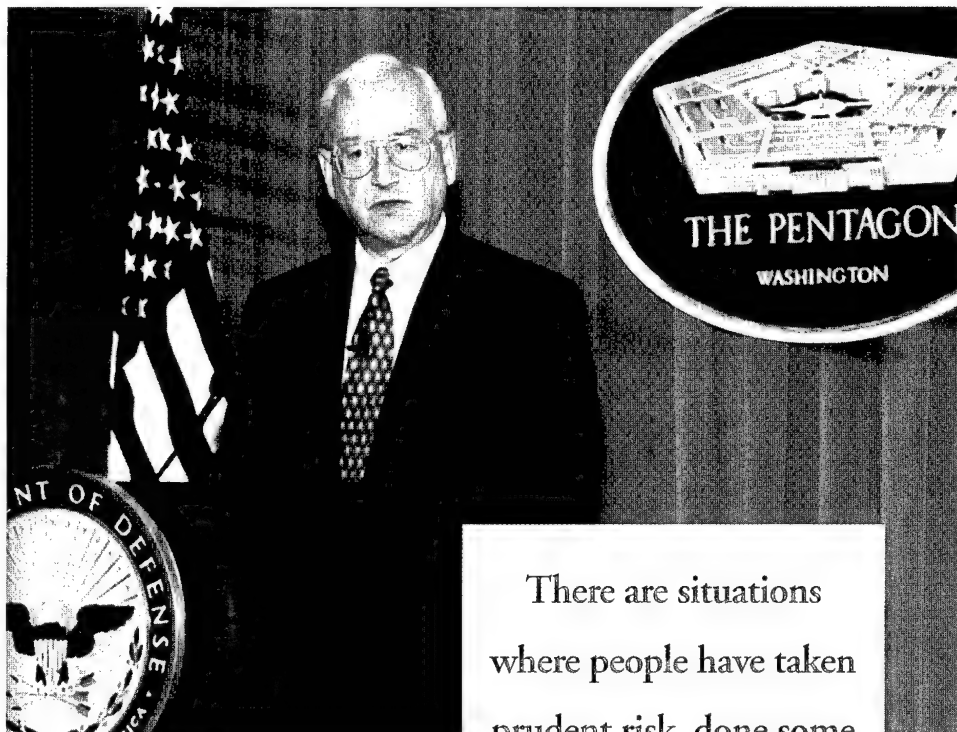
A

Yes. We are doing some fundamental things to look at that. Probably among the most fundamental things is moving to open systems kinds of environments where commercial elements can plug and play into our designs.

As we're looking at new systems, I couldn't think of a better way to do that than what we're doing with our Joint Strike Fighter—basically building what is a modular aircraft, three completely different aircraft built on the same manufacturing line, with something between 80- and 90-percent cost commonality of the major components. So [we're looking at] the ability to produce those components at a rate of 3,000, even though some of the designs are only being produced in a few hundreds.

Q

You mentioned the example of the smart ship—that they can reduce manning of the ship by 20 percent. There are other



initiatives—I'm thinking of privatization—that would replace the number of soldiers needed to do a given task, and certainly maybe changes in tactics as well, that reduce the number of troops needed.

Let me ask you, these acquisition reform initiatives or your infrastructure reform initiatives, will any of these be able to contribute to reducing the end strength of the armed forces as the Quadrennial Defense Review (QDR) looks at that?

A

Yes, I believe so. And I think you have to allow for the fact that force structure and end strength are not the same thing. A large piece of our end strength is associated, in a tail sense, with supporting our active forces. Those are some of the things we're trying to attack as well.

Q

Can you give us a sense of how far reforms can get you in that arena?

There are situations where people have taken prudent risk, done some good things in acquisition, and it hasn't worked out for one reason or another. That's a category of people I've been looking for. Some of those people need to be rewarded.

A

I think they can be very substantial. I gave you this example of the prospect of 20 percent or perhaps more on this large ship. Those are not unreasonable numbers.



A question on the workforce. In 1993, Les Aspin fired a number of C-17 officials for bad performance on the program. That cast a pall over the entire acquisition community. I've followed the program. To what extent were you burdened by that action, in terms of a lot of your acquisition bureaucrats not wanting to be too creative for fear of penalties?



Yes. I think there's an important element here of not just talking the talk, but walking the walk. That is, having our behavior be what it needs to be here. There are situations where people have taken prudent risk, done some good things in acquisition, and it hasn't worked out for one reason or another. That's a category of people I've been looking for. Some of those people need to be rewarded. Circumstances turned badly, it was something out of their control. They thought "out of the box" and were trying to do the right things. So we do need to encourage and reward that kind of behavior.

The reason we got into the kind of conservative behavior that we have gotten into in the past is that there wasn't much benefit for thinking out of the box and doing really creative things. Not much recognition. But there were huge penalties if you did it and it didn't work out.

So if you think about those rewards and penalties, it drives people to very conservative behavior.



What are some of the rewards then?



You've seen some of the recognition programs. These are going on at many different levels. Actually, one of the biggest elements of recognition for our people is to be able to tell their story to their peers.



You talk a lot about cutting down the cycle time, getting systems out to the field. You talk a lot about this teaming

arrangement, how that's been a big part of that. How large of a role has just the mere fact that the Pentagon is looking more at off-the-shelf systems cut down on cycle times? I would think that that plays a role as well, not just the new sort of restructured organizations.



It plays a role, but I actually see it maybe being a driver more than a contributing element. What I mean by that is just being able to buy a commercial subsystem, for example, doesn't help very much if your underlying cycle time is 12 years. The problem you run into is by the time you field the commercial system, especially if it's computer-based or rich in information technology, by the time you field it 12 years later, you're three generations out of date. So that fact creates what I was describing as the driving force to go back and change our cycle times.

What you want to be able to do is pick that off the shelf and integrate it into a system in which the overall cycle time in fielding and training and preparing for now is a few years, not 12 years.



My second question was, there are some who claim that some of the acquisition reforms have led to more contract award protests in the past. Is that true, in your view? And also, are there steps that may be taken to try and minimize those? Obviously, that screws up the system as well.



I don't think that our reforms have led to an increase in protest. Actually, if there's something that would lead to an increased tendency to protest, it has been some of the market forces that have caused our industry to reduce size. That is, some of the awards may [have been perceived] as "you're-going-out-of-business-if-you-don't-win-the-award," so companies want to understand very carefully—why did they lose? Were they fundamentally non-competitive?

One of the things we've done to address that is to try to provide a

much more thorough debriefing so the companies can get the answer to that question in the debriefing; they [then] don't have to protest to be able to get sufficient information to get that answer. I think actually, our protest history is improving as a result.



A question on Theater High-Altitude Air Defense (THAAD). You're talking a lot about reducing cycle time and acquisition reforms. And certainly THAAD is a program in which you and the Army and Ballistic Missile Defense Office are trying to speed up the process here. But it seems to me that given its testing record so far, perhaps THAAD might be a candidate for lengthening the acquisition process, not shortening it. What are your thoughts on that?



Yes. I think I have been on record pretty clearly about being concerned in some areas of trying to go too fast on some elements of ballistic missile defense. We have been leaning forward to proceed as rapidly as we could. In some cases, we may be going too rapidly. We are on the edge of how far I could be comfortable, how fast we could be comfortable going in a few of our programs. I think we really need a serious look at THAAD—where we are in the design. I've chartered a team to go do that in a period of about six or seven weeks: to look at the design, the margins in the design, as well as the failures.



Emmett Paige this week signed off on the information technology (IT) management strategic plan. What's your impression of what role this plan might play in this whole environment?



This plan, I think, has a key role to play here. Many of our systems are becoming more and more information-based and information-dependent. Sorting out architectures in which various components will plug and play together is very critical to get leverage from that base. Establishing

standards, moving to open system standards, in particular, to allow for successive upgrades without huge costs are very important to us.

Q When you started this effort there was, especially on the MilSpec side, some concern from the international side that if you team with a U.S. program where all these MilSpecs are gone, some of the confidence might be eroded. How has that played out over the last year?

A I think it's still an issue, but I noticed a great interest among my counterparts both in Europe and in Japan in our acquisition reform initiatives—our initiatives to move away from MilSpec. There's great interest. We've had a couple of conferences. Almost every visit that I have from a counterpart acquisition executive will inevitably end up in a discussion—wanting to know more about our acquisition reform initiatives and how to stay on top of them.

Q In regard to your chart on acquisition and program stability, this looks a lot like some of the findings that Program Analysis and Evaluation (PA&E) has come up with over the years, several years ago...in terms of mismatches between plans and the budgets we have to carry them out. I'm wondering if that was a recognition that DoD has had for several years? What have been the obstacles and challenges in getting that more in hand so you aren't wasting [resources]?

A This building [Pentagon] and our processes are really very averse to creating any reserves. Also, until we bring ourselves to the point of doing that, we will continue to have these kinds of problems. If you go examine the 777 program at Boeing, they had a reserve for the program. Reserve is very critical to meet the milestones and the performance. You can adjust the reserve as you go.

We, too, have had a reserve for our program. The only problem with it has

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been the sign is negative. It's not been a positive reserve, it's been a negative reserve. You can imagine that creates some real management challenges in terms of trying to execute a stable, investment-oriented program.

Q How would you propose to deal with it?

A We will need to do some work to establish some reserves in our planning in the out-years. We will have to do some work to gain better estimates in advance on our operations and maintenance (O&M) requirements because we have been paying last-minute bills there that weren't planned for. We need better estimates of our O&M costs. And I think we need a more fundamental tack with EM, with the costs associated with those systems in the inventory.

Q In reference to the O&M costs. I know in the past the Pentagon has tried to propose to Congress certain ways to either have a separate fund that could pay for

those things so you wouldn't have to raid other accounts. In the past, Congress hasn't seemed to be too happy about that idea. Is there anything that can be done to better convince Congress that this really is a problem and it's affecting us not just year by year, but out to the future in working some kind of deal where there could be a reserve that could be used to pay some of these last-minute bills?

A There are two elements of a reserve. One is taking a reserve forward and presenting it to the Congress. I think that's going to be a hard sell. The proposals we're looking at don't include that kind of a reserve.

I think the way we're looking to address this problem, first off, is to budget for known contingencies, either through supplementals or budgeting in advance. Secondly, in the out-years in our planning, trying to put some reasonable contingency reserves in our own plans. We don't have to take those to the Congress; they're in our own Future Years Defense Program (FYDP). The issue is having the discipline to do that. Also, perhaps, the consideration of putting some reserves in the programs themselves.

Q What do you do about congressional add-ons? That doesn't help the process, does it—putting in money for things you haven't asked for?

A Either adding money in ways that haven't been planned or taking money away certainly is disruptive to a long-term program.

There have been suggestions by some people of actually modifying the budget process—going to two budgets. A capital budget with stability for a capital budget program, and an operating budget. Many companies operate that way. It's something we probably need to think about a little bit.

Thank you all very much.

Surfing the Net

An Internet Listing Tailored to the Professional Acquisition Workforce

DEPARTMENT OF DEFENSE

**Under Secretary of Defense
(Acquisition and Technology)
(USD[A&T])**

<http://www.acq.osd.mil/HomePage.html>—
Helps locate a specific office or
USD(A&T) document.

**Deputy Under Secretary of
Defense (Acquisition Reform)
(DUSD[AR])**

<http://www.acq.osd.mil/ar>
Information on upcoming events, leg-
islation, and DUSD(AR) organizational
breakout. "Ask A Professor" link allows
users to ask questions and receive
responses within 10 business days.

**Acquisition Systems Management
(Defense Acquisition Board [DAB]
Executive Secretary)**

<http://www.acq.osd.mil/api/asm/>
Information on organization, mission,
products, customers, and Frequently
Asked Questions (FAQ).

**DoD Acquisition Workforce Home
Page**

<http://www.dtic.mil/acqed2/acqed.html>
Current legislation, regulations, critical
acquisition positions, and FAQs for the
acquisition workforce.

Defense Acquisition Deskbook

<http://deskbook.osd.mil/deskbook.html>
Automated acquisition reference tool
covering mandatory and discretionary
practices as well as procurement wis-
dom.

**Defense Acquisition University
(DAU) and Acquisition Reform
Communications Center (ARCC)**

<http://www.acq.osd.mil/dau>
DAU course and schedule informa-
tion. ARCC provides extensive Acquisi-
tion Reform training information and
materials.

**Army (Deputy Chief of Staff for
Acquisition, Army Materiel Com-
mand)**

[http://www.dtic.mil/amc/acq/acqmenu.
html](http://www.dtic.mil/amc/acq/acqmenu.html)
Training and career opportunities,
Army Acquisition Corps points of con-
tact, materiel acquisition
management, course schedule, and
acquisition bulletins.

Army Acquisition Executive

<http://www.sarda.army.mil/>
Links to other SARDA organizations;
allows users to register for automatic
E-mail notification of Home Page
updates.

Army Acquisition Corps (AAC)

<http://www.sarda.army.mil/dacm/>
Training and education and career
development opportunities within the
AAC.

Navy Acquisition Reform

<http://www.acq-ref.navy.mil/>
Policy and guidance, resource lists,
tools, and training opportunities.

Air Force (Contracting)

<http://www.hq.af.mil/SAFAQ/contracting/>
Business opportunities with the Air
Force, various training options, and
library of publications.

Air Force (Acquisition)

<http://www.safaq.hq.af.mil/SAFAQ>
Shop Talk; "Ask AQ" and receive
answers within two business days.

**Air Force Materiel Command
(AFMC) Contracting Laboratory's
Federal Acquisition Regulation
(FAR) Site**

<http://farsite.hill.af.mil/>
FAR search tool; information on open
FAR and Defense Federal Acquisition
Regulation (DFAR) cases; Federal

Register; *Commerce Business Daily*
Announcements; and Electronic
Forms Library.

HQ AFMC/PK Training

<http://www.afmc.wpafb.af.mil/>
Access "Organizations," "PK Contract-
ing," "PKX, Resource Management,"
and "Training" to obtain Air Force train-
ing references, tools, guidebook, and
link to Lightning Bolt #9 Training.

**Defense Advanced Research Pro-
jects Agency (DARPA)**

<http://www.arpa.mil>
Planned procurement examples avail-
able for downloading.

**Defense Information Systems
Agency (DISA)**

<http://www.disa.mil>
Structure and mission of DISA.

**Defense Systems Management Col-
lege (DSMC)**

<http://www.dsmc.dsm.mil>
DSMC educational products and ser-
vices.

**National Imagery and Mapping
Agency (NIMA)**

<http://www.dma.gov>
Geospatial and imagery information,
publications, and business opportuni-
ties.

**Defense Modeling and Simulation
Office (DMSO)**

<http://www.dmsomil>
Focal point for information concerning
DMSO activities.

**Defense Technical Information
Center (DTIC)**

<http://www.dtic.mil/>
Information on planned, ongoing, and
completed defense-related research.

**DoD Electronic Commerce/
Electronic Data Interchange Office
(EC/EDI)**

<http://www.acq.osd.mil/ec/>

Information on Central Control Register, Value Added Networks, current EDI sites; online resources.

Open Systems Joint Task Force

<http://www.acq.osd.mil/osjtf>

Open Systems education and training opportunities, standards selection, documentation, key briefings, and evidence of benefits.

FEDERAL CIVILIAN AGENCIES

ARNET (Joint Effort of the National Performance Review and Office of Federal Procurement Policy)

<http://www.arnet.gov/>

Virtual library, procurement resources, best practices, business opportunities.

Federal Acquisition Institute (FAI)

<http://www.gsa.gov/staff/v/training.htm>

One-stop acquisition training shop. Federal Acquisition Streamlining Act resource materials; FAR and Federal Acquisition Reform Act.

General Accounting Office (GAO)

<http://www.gao.gov>

Investigative arm of Congress; examines matters relating to the receipt and disbursement of public funds. Allows users access to GAO reports, FAQs.

General Services Administration (GSA)

<http://www.gsa.gov>

Online shopping for commercial items to support government interests.

National Performance Review (NPR)

<http://www.npr.gov/>

Government cost-savings advice; "how to" tools.

**National Technical Information
Service (NTIS)**

[http://www.fedworld.gov/preview/
preview.html](http://www.fedworld.gov/preview/preview.html)

Check out OrderNow for online products.

**Small Business Administration
(SBA)**

<http://www.SBAonline.SBA.gov>

Communications network for small businesses.

U.S. Coast Guard

[http://www.dot.gov/dotinfo/uscg/
welcome.html](http://www.dot.gov/dotinfo/uscg/welcome.html)

General Coast Guard information.

**INDUSTRY AND PROFESSIONAL
ORGANIZATIONS**

Aerospace Industries Association

<http://www.access.digex.net/-aia/>

Information about the most critical issues facing today's U.S. aerospace industry and access to related Internet sites.

Commerce Business Daily

<http://www.govcon.com/>

Access to current and back issues with search capabilities; business opportunities; interactive yellow pages.

**Consortium for Advanced Manu-
facturing—International**

<http://www.onramp.net/cami>

Activities of this non-profit manufacturing research organization include activity-based costing and activity-based management.

**Electronic Industries Association
(EIA)**

<http://www.eia.org>

Government Relations Department includes links to issue councils.

**National Contract Management
Association (NCMA)**

<http://www.ncmahq.org>

"What's New in Contracting?"; educational products catalog.

**Society of Logistics Engineers
(SOLE)**

<http://www.telebyte.com/sole/sole.html>

Online desk references that link to advice in solving logistics problems.

TOPICAL LISTINGS

ACQWEB Index of Offices by Title

[http://www.acq.osd.mil/acqweb/
topindex.html](http://www.acq.osd.mil/acqweb/topindex.html)

Great launch pad to acquisition specific sites and topics.

**DoD Specifications and Standards
Home Page**

[http://www.acq.osd.mil/es/std/stdhome.
html](http://www.acq.osd.mil/es/std/stdhome.html)

DoD Source Selection Plan products and pricing information; military standards and specifications reform; standardization library; training opportunities; FAQs.

Earned Value Management

<http://www.acq.osd.mil/pm>

Information on implementation of Earned Value Management, including latest policy changes, standards, international developments, and an active notebboard.

**Electronic Commerce Resource
Center (ECRC)**

<http://www.ecrc.gmu.edu/location.html>

Connects to other ECRCs across the United States.

**FAR, Circulars, and Supplements
from GSA**

<http://www.gsa.gov/far>

The latest FAR information and specific references.

GSA Advantage

<http://www.fss.gsa.gov>

Assistance in using the government-wide purchase card.

**Single Process Initiative (SPI)
Information**

<http://www.dcmc.dcrb.dla.mil>

SPI policy, guidance, procedures; information sheets; lessons learned.

If you have questions about the above sources, or would like to add your Website to this list, please call the Acquisition Reform Communications Center (ARCC) at 1-888-747-ARCC.

CAIV Impact on Program Management

Expect Conflict, But Don't Allow It to Corrupt Your Methodology

ANN BLEY

This article presents the means by which the Grizzly vehicle program dropped its Average Unit Procurement Cost (AUPC) from approximately \$6.75 million in FY95 constant dollars (C\$) to \$5.07 million in FY95 C\$ via the use of acquisition reform initiatives. None of these initiatives are particularly innovative if considered from a business perspective. What was new was their use collectively to manage, and the top-down emphasis placed on the use of these initiatives.

Background

To begin, AUPC is the average cost for a defense system in the production phase of the system's life cycle. To derive AUPC, the sum of system production costs across all fiscal years of production is divided by the total vehicle quantity that can be produced across all years at that production cost. Production costs include contractor and government facilitization, manufacturing, management, and fielding. In the development of system cost estimates, the life-cycle model used by cost estimators groups life-cycle costs with research and development costs under the 1.0 cost elements, procurement costs in the 2.0 cost elements, and operations and sustainment in the 3.0 cost elements. The production costs used to calculate AUPC defined in life-cycle cost estimate terms are the costs located in cost elements 2.0 to 2.10. Again, these costs include such things as initial production facilities



(cost element 2.011), manufacturing (cost element 2.021), system test and evaluation (cost element 2.05), system/project management (cost element 2.06), and fielding (cost element 2.10).

At Milestone I (MS I), the Milestone Decision Authority (MDA) judges

whether a system should enter into the Program Definition and Risk Reduction phase (formerly Advanced Development [AD] phase), and if approved for the phase, technological solutions then migrate into a system concept. At MS I, the estimate of AUPC for the Grizzly vehicle was around \$3.6 million in FY92 C\$. Three years later, and

Bley is an Army program analyst with 10 years' experience working primarily with weapons and tracked combat vehicle budgets, Tank-Automotive Command (TACOM), Warren, Mich. She currently works in the Program Executive Office, Ground Combat Support Systems. From March 1995 to March 1996, she participated in the Army Acquisition Mentoring Program as a protégé to the Deputy Assistant Secretary for Plans, Programs, and Policy. In May 1996, TACOM designated her as one of two "Cost As an Independent Variable" subject matter experts in support of Acquisition Reform Acceleration Day at the Tank-Automotive Command.

a year prior to the planned Milestone II decision, the revised, validated estimate of production costs indicated that AUPC was about \$6.5 million in FY92 C\$ (\$6.75 million in FY95 C\$). The factors that led to an almost doubling of AUPC were: underestimated and new technical requirements, limited historic data upon which to base the original cost estimate, and pressures from management during the

same as those that caused the production cost increase; moreover, the RDT&E cost increase was the result of a planned RDT&E phase which, in execution, was too short to support system design maturation requirements.

Enter Acquisition Reform

About the same time that the cost estimators calculated the \$6.7-million

technical. Although important, cost objectives came in a lagging third.

With the advent of acquisition reform, the prioritization of objectives now appears reversed. The new management direction appears to make cost its No. 1 priority, closely followed by technical. This was especially my impression when my Program Manager (PM) communicated the increase in AUPC to the PEO.

The PEO response to the PMO projected increase to AUPC was that the increase to the estimate of AUPC from Milestone I was unaffordable: much lower program costs would have to be developed as the basis for the upcoming Program Objective Memorandum budget submission. The PEO direction to the PMO was to bring down unit procurement cost; to accomplish a lowered procurement cost, the PMO was to work with the contractor and the combat developer to identify program savings through the use of acquisition reform initiatives. Understandably, the PEO wanted assurance of the validity of program cost savings achieved, and cautioned the PMO that any decrease to AUPC had to be one that the contractor was willing to "buy into." That is, the contractor had to agree that the production contract cost of the target AUPC would be the actual contract cost when the system went into production.

Identification of Cost Drivers and Opportunities For Savings

After the PEO communicated that program costs must be lowered, the PMO began to develop a process to lower program AUPC. The first step was analysis at the action-officer level to identify program cost drivers, and opportunities for cost savings. Since this was to be a joint government/contractor effort, as part of this analysis government and contractor cost personnel met to determine if the contractor's estimates for manufacturing costs reconciled with government estimates. If government costs for manufacturing did not reconcile with the contractor, we needed to know why, and to devel-

Before the implementation of acquisition reform initiatives, the priority assigned to cost, schedule, and technical program objectives placed primary emphasis on the accomplishment of program schedule, closely followed by technical. Although important, cost objectives came in a lagging third.

development of the original estimate to assume that lower projections for estimated program cost were the most likely.

In addition to the increase in production costs, Research, Development, Test, and Evaluation (RDT&E) costs also came in at an increased cost—roughly \$254.6 million in FY92 C\$ (\$271.0 million in FY95 C\$), from an MS I total of approximately \$84.6 million in FY92 C\$. The reasons for the increase in the RDT&E cost were the

AUPC, the concept of acquisition reform started to filter down to Program Executive Office (PEO)/Program Management Office (PMO) levels. Acquisition reform in my PMO had a significant impact.

Before the implementation of acquisition reform initiatives, the priority assigned to cost, schedule, and technical program objectives placed primary emphasis on the accomplishment of program schedule, closely followed by

PROTOTYPE



op adjustments to government and/or contractor cost models that resulted in estimates that basically projected the same program costs.

This was not the easiest task to accomplish, but was much easier than I originally would guess. A prototype vehicle fabricated by the contractor during the Program Definition and Risk Reduction (formerly AD) phase provided real-world costs from which to derive future production costs. Both the contractor and the government cost estimators used the prototype fabrication cost as the basis for their estimates of system production cost in the vehicle production phase of the system life cycle. Reconciliation became a matter of understanding the breakdown of government versus contractor estimates of manufacturing and other contractor costs.

The follow-on action to complete the first step in the process—the identification of cost drivers and opportunities for savings—was developed as a sort of laundry list for further review and analysis at a future time. (It is interesting to note that the action officers involved in the identification effort had certain cost drivers that they already felt should be targeted prior to the analysis. Perhaps they were thinking, “Here is the opportunity to cut out some of the fat in the program.” It almost seemed as if they had been waiting for an opportunity such as this.)

With the completion of the first step in the process to lower program costs, the PM, at the direction of the PEO, called a meeting between government and contractor upper management levels. In attendance were the PEO, the contractor Chief Executive Officer, and the Commandant of the Training and Doctrine Command school assigned as the combat developer for the system. At the meeting, the PM presented the analysis of cost drivers, specifically identifying those cost drivers with high savings potential. The PM asked top management for a decision in response to the question: “To reduce costs, which cost drivers should

receive the most emphasis?” In addition, the PM asked for approval to give action officers the flexibility to decrease program costs via changes in design and technical solutions, and in some cases, to bring up for discussion a reconsideration of the combat developer’s originally identified requirements. Top management at this meeting took the initiative and identified the cost drivers for the PMO to focus on, and specified, as had been requested, the scope of further analysis.

Further, top management extended the direction of further analysis by setting what at the time seemed to be impossible cost objectives for total RDT&E and production costs. The first objective required a 20-percent decrease to the RDT&E costs from what was the estimated total cost for the Engineering and Manufacturing Development (EMD) phase (RDT&E after the Milestone II decision). The second objective was to decrease AUPC from \$6.75 million FY95C\$ to \$5.0 million FY95C\$, which translated to an approximate 35-percent decrease in the estimated cost for the vehicle production phase.

After this meeting, the process was again down at action-officer level. From the management-approved cost drivers we were to focus on, the contractor personnel developed program changes with estimates of cost reductions if they, in fact, implemented these changes. As indicated earlier, these proposed changes addressed changes to system design, technical solutions, or combat developer-identified requirements. The PM called an action officer meeting, with personnel from the contractor, the PMO, PMO matrix support offices, and from the combat developer school. At this meeting, we either accepted, deferred, or declined contractor-developed proposals.

- Accepted proposals were those the PM and the combat developer felt were in accordance with top management’s direction on the specific cost drivers.

- Deferred proposals required further analysis before these could be accepted or declined.
- Declined proposals, for various reasons, were not to be further considered as means to reduce program costs. In the case of declined proposals, the government believed the proposed changes would degrade system performance or they were out of the range of what the combat developer could live with in terms of requirement adjustments.

Follow-on activity after this action-officer meeting began with further refinement of cost impacts of the accepted and deferred proposals. Contract personnel developed initial cost impacts for the accepted and deferred proposals. Government personnel then reviewed the proposals to determine the validity of estimated cost savings, and in addition, which cost savings proposals to include in program cost models.

We did not incorporate all of the accepted proposals into the cost models. Part of the problem was that these either were too small to make a substantive change to program costs, or data available on cost savings were not adequate to provide costs that could be validated during the cost estimating process. An example of an accepted proposal, which was not included in the government’s cost model, was the contractor’s proposal to standardize quality assurance activities across all government contracts. This was in line with the spirit of acquisition reform; government personnel accepted almost all of the specific standardization actions proposed by the contractor. Unfortunately, in most cases the quality initiatives seemed to generate only small per-vehicle savings (as an example \$100/vehicle), or could not be sufficiently quantified to develop valid cost savings. As a result, government personnel did not believe it was reasonable to include these in the cost models, even when these smaller cost proposals were accepted for implementation.

In the case of cost savings proposals with low per-vehicle savings, these did not generate sufficient program savings to justify activity to accurately identify savings achieved, to make legitimate adjustments to the model, and to maintain an audit trail of the savings from the accepted proposal. The PMO decided to incorporate only those accepted proposals that were major cost savers. To date, this seems like a smart decision since keeping track of the impact of the proposals incorporated in the cost model on program costs has been relatively manageable. The PM organization structure provides insufficient resources to manage cost savings proposals with a marginal return: if 40 percent of the cost savers generate 80 percent of the savings, it would not be cost effective to build the other 60 percent of the cost savers into the model. This was our rationale in the migration of the cost savers into the program cost models.

The result of the review of the contractor's accepted and deferred savings proposals was that the government made final decisions about what cost savers to include in the budget laydown. We added all of the accepted and two deferred proposals with a high probability of acceptance into program automated cost models, which are used to develop program RDT&E and production costs, and which would be the basis for budget submissions. These plus program cost decreases from a proposed multi-year procurement contracting strategy generated sufficient savings ultimately to accomplish the objective for AUPC set by top management. This was the "do or die" objective.

The second cost objective for RDT&E cost savings was not met; at the final briefing to the PEO, the projected cost savings came in at a 3-percent decrease. The good news though, was that in spite of the trade-off required between design cost and AUPC in accomplishing the AUPC objective, program RDT&E costs decreased.

Lessons Learned

Let me conclude this article with a discussion of the lessons learned that I view as most important in using acquisition reform to lower program costs. Overall, I think these are good rules of thumb for any PMO faced with similar pressures to lower program costs. These are my opinions; however, I believe, based upon my experience with the implementation of the Cost As an Independent Variable (CAIV) acquisition reform initiative, that these are valid conclusions:

First, Get the Green Light From Top Management. In order for the concept of CAIV to work effectively, the decision to implement the concept and the definition of the scope of the effort in lowering costs must be a top-down-type management activity. Many of the savings initiatives incorporated in our final program laydown were the subject of discussion at action-officer levels prior to the initiation of a formal action by the PEO. What was missing in the past was the go ahead from top management to further define these and then implement the initiatives. I must emphasize that the implementation of the initiatives would have been *impossible* without management approval. The scope of the initiatives impacted key requirements of the combat developer, the materiel developer, and the prime contractor, and required their approval before the PM could take action.

Acquisition Reform and Program Savings Expectations. Standard acquisition reform-type activity may not necessarily result in big program savings. For our program, changing the contract quality standards had a minimal impact on overall program costs. At least for cost estimating purposes, we were unable to document substantial savings.

Cost Savings: Production Phase vs. RDT&E Phase. If the objective is to achieve cost savings in the production phase, savings in the RDT&E phase may not also be possible. In the case of my assigned program, each contrac-

tor-proposed AUPC savings was also estimated by the contractor to result in an increased cost in RDT&E work to support the production savings. The initial briefing back to the PEO presented some savings in RDT&E costs, but these were not even close to the original objective set by management.

Cost Savings Actions: Periodic Review vs. Ongoing Activity. If the objective is to achieve high cost savings in a single action, then periodic program scrubs will accomplish this. Since programs seem to add requirements and costs as a life-cycle stage progresses, I would think that the most likely opportunity to find substantial savings would be just prior to the next upcoming milestone review. By "just prior," I mean about a year and a half prior to the review; this will allow adequate time to develop validated Program Office Cost Estimates (POE), which are requisite as part of the milestone documentation.

If the objective is to ensure that looking for cost savings opportunities becomes a part of the PMO way of doing business, then ongoing review of program costs via the Integrated Product Team (IPT) concept will accomplish this. As a way to ensure that costs will not escalate and to seize any opportunities for genuine savings, my PMO chose the latter course of action. Toward that end, as part of our EMD contract, we established a Cost Reduction IPT, including the contractor, PMO, and combat developer action officers.

Find The Right Software and Automate. To expedite the development of cost estimates, it is important to get simple and easy-to-work-with software tools. The automated tools should have the capability to incorporate data and output program laydowns very quickly. For the Grizzly study, we developed RDT&E and production spreadsheets using *Microsoft Excel* software that broke down costs by cost elements; as reductions were made to cost elements, these could easily be incorporated into the model. The

production cost model further broke down production costs into hardware components, again allowing for easy incorporation of reductions to component costs. In addition, the production model had the capability to provide an automatic estimate of cost when changes to annualized production quantities were made.

Find the Right People. One very important ingredient in our process to accomplish the AUPC savings objective was our action-officer mix. Who have you got to make this happen? Minimally, you need a competent cost analysis, and engineering staff. The cost function must be very familiar with the cost make-up of the program. The engineering function must be skilled in reviewing what the contractor proposes and "weeding out the smoke and mirrors" in what the contractor proposes as candidates for cost savings.

Minimize "Creative Money Management" Techniques. Speaking of "smoke and mirrors," don't allow this to become your guiding principle in doing the analysis. At one point in our study, a suggestion surfaced that we

just do across-the-board percentage cuts to the cost cells to accomplish the cost objective. As an action officer responsible for study procedure, I argued strongly against this idea. At the time I believed it was too early to make any assumptions for savings without a clearly defined means to accomplish these savings. My suggestion was to let the study take its course, and see what the projected savings would be using only decreases to cost, based upon valid cost savings proposals.

Ultimately, we managed to achieve the cost objective with a minimum, if any, of what could be called "creative money management" techniques. As a result, the cost estimate used to accomplish the program cost objective was the basis for our validated POE. To date, the POE has withstood independent cost estimator's review. *Expect conflicts, but again, don't allow these to corrupt your methodology.*"

Identify Where You Want to Achieve Cost Savings. Finally, based upon my experience and what I know of other PMOs involved in similar efforts, if the objective is to achieve savings in the

production and operations phases of a system, the time to be laying the groundwork is in the RDT&E phase. The Program Definition and Risk Reduction phase or before is preferred to the EMD phase or after.

If you're trying to achieve savings in the production phase, I believe you just might find yourself scraping the bottom of the barrel looking for savings opportunities. It can be done, but it seems that since system design is mature, opportunities for major changes to system requirements/design are much fewer than in earlier program phases and therefore, real high-dollar opportunities to lower costs are fewer. In order to accomplish cost savings goals in the production phase, it may be necessary to increase the quantity of planned savings initiatives since the savings initiatives might not have the high-dollar values as would be possible in earlier program phases. As a result, you may end up with an unmanageable number of cost savings initiatives, which ultimately you will have to execute in order to accomplish your savings objectives.



A RMY BRIG. GEN. RICHARD A. BLACK, DSMC COMMANDANT, CONFERS WITH DONNA RICHBOURG, ASSISTANT DEPUTY UNDER SECRETARY OF DEFENSE FOR SYSTEMS ACQUISITION, AND ACTING DEPUTY UNDER SECRETARY OF DEFENSE FOR ACQUISITION REFORM. RICHBOURG ASSUMED THE POSITION OF ACTING DEPUTY UNDER SECRETARY EFFECTIVE JANUARY 18, 1997.

NINTH ANNUAL INTERNATIONAL ACQUISITION/PROCUREMENT SEMINAR



JULY 7-11, 1997

Sponsored by the
International Defense Educational Arrangement (IDEA)
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Preparations Underway for Ninth Annual Acquisition/Procurement Seminar

Mannheim, Germany, Site of 1997 International Seminar

RICHARD KWATNOSKI

The Ninth Annual International Acquisition/Procurement Seminar will be held in Mannheim, Germany, at the Federal Academy of Defense Administration and Military Technology (BAkWVT), 7-11 July, 1997. The Federal Academy, which hosted the fifth Seminar four years ago, becomes the first International Defense Educational Arrangement (IDEA) member institution to host two Seminars.

Planning is well underway, and much of the schedule is complete. The Seminar focus, as always, will be international cooperative acquisition projects, or "armaments cooperation"—the term more commonly used in the international community. As in past seminars, the German, French, British, and American acquisition practices, as related to international projects, will be covered in depth.

Alfred Volkman, the Assistant Deputy Under Secretary of Defense for Armaments Cooperation, has agreed to provide the U.S. national presentation. For the first time, a presentation on global defense trends will be provided by a representative of the Australian Defense Forces Academy. There will also be presentations on international project management from government

BRIG. GEN. CHARLES McBEAN, DEPUTY COMMANDANT, ROYAL MILITARY COLLEGE OF SCIENCE, DELIVERS THE OFFICIAL WELCOME AND OPENING REMARKS AT THE EIGHTH ANNUAL INTERNATIONAL ACQUISITION/PROCUREMENT SEMINAR.



THE FEDERAL ACADEMY OF DEFENSE ADMINISTRATION AND MILITARY TECHNOLOGY WILL HOST THE NINTH ANNUAL INTERNATIONAL ACQUISITION/PROCUREMENT SEMINAR, 7-11 JULY, 1997, IN MANNHEIM, GERMANY.

Photo courtesy Richard Kwatnoski

Kwatnoski is the Director, International Acquisition Courses, Executive and International Department, School of Program Management Division, DSMC.

ARMY BRIG. GEN.
RICHARD A. BLACK,
COMMANDANT, DEFENSE
SYSTEMS MANAGEMENT
COLLEGE, JOINED
MCBEAN IN WELCOMING
THE PARTICIPANTS TO
THE EIGHTH ANNUAL
INTERNATIONAL ACQUISITION/PROCUREMENT
SEMINAR.



and industry, cost performance responsibility, as well as several workshops and tours. The last day of the Seminar will offer participants a choice between presentations on acquisition/procurement education or foreign comparative testing.

Last year's Seminar, conducted at the Royal Military College of Science (RMCS) in the United Kingdom, proved a resounding success. Over 70 participants from nine nations attended: the four member nations consisting of the United States, United Kingdom, Germany, and France; plus Canada, Denmark, The Netherlands, Spain, and Australia. In addition to international cooperative acquisition projects, other topics covered included comparative acquisition practices of the IDEA nations, international project management, intellectual property rights, international industrial cooperation, and acquisition/procurement education.

The Annual Seminar has a bonus to the U.S. acquisition workforce participants in providing equivalency to the assignment-specific Multinational Program Management Course (Defense Acquisition University Course PMT 202).

For the U.S. acquisition workforce participants in the European theater, this is a unique, annual opportunity to obtain acquisition training and education along with their allied peers at a level appropriate to their experience, without incurring the significant expense of traveling back to the United States.

For those interested in attending this year's event,

please see the Seminar ad on p. 29 of this issue.

FROM LEFT: MAJ. GEN. D.J.M. JENKINS, COMMANDANT, RMCS, AND ADM. SIR ROBERT WALMSLEY, THE BRITISH CHIEF OF DEFENSE PROCUREMENT. WALMSLEY DELIVERED THE KEYNOTE ADDRESS FOR THE EIGHTH ANNUAL INTERNATIONAL ACQUISITION/PROCUREMENT SEMINAR.



FROM LEFT: SEMINAR DIRECTOR, DSMC PROFESSOR RICHARD KWATNOSKI, CONFERS WITH PETER ROLLER FROM THE GERMAN FEDERAL ACADEMY OF DEFENSE ADMINISTRATION AND MILITARY TECHNOLOGY (BAkWVT) AT LAST YEAR'S SEMINAR, CONDUCTED AT THE ROYAL MILITARY COLLEGE OF SCIENCE (RMCS), UNITED KINGDOM, JULY 8-12, 1996.



DSMCAA Welcomes Newest Chapter to Southern Maryland

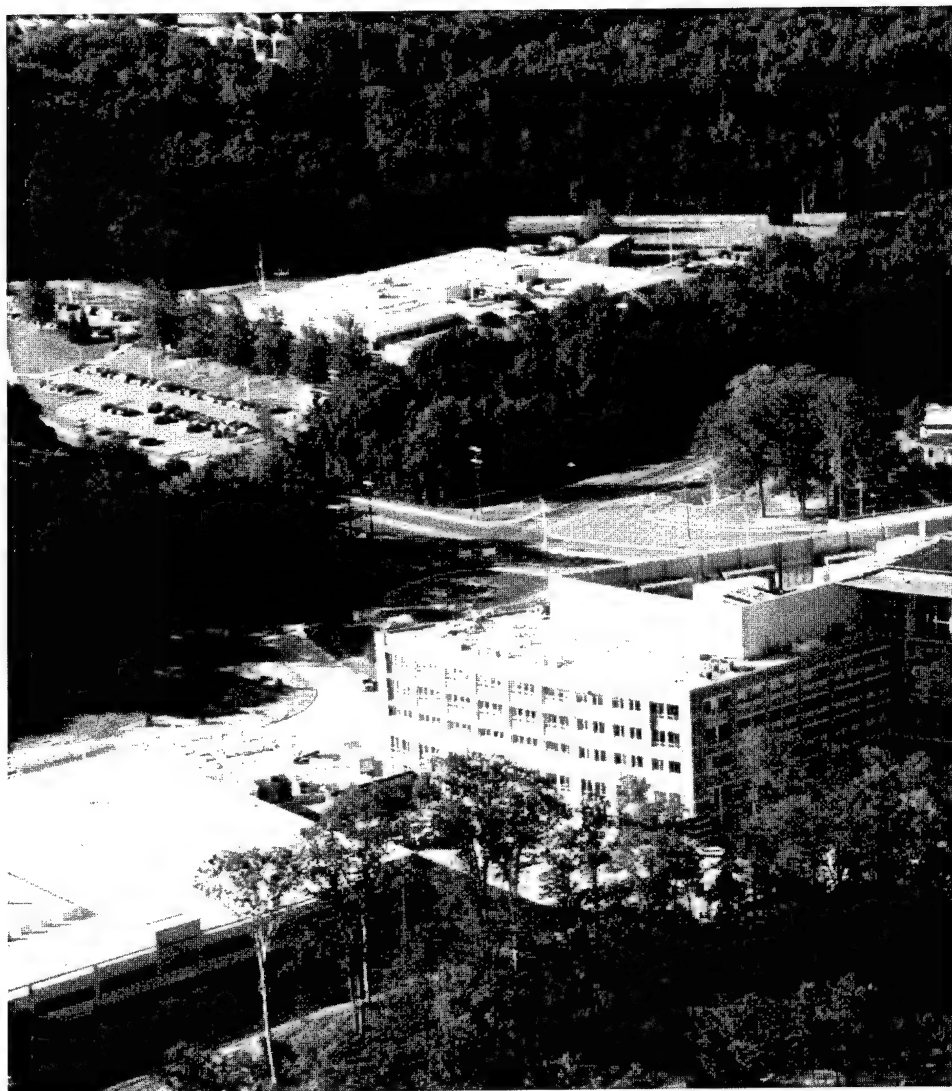
Patuxent River Prepares for Influx of Naval Acquisition Personnel

TOM MADAY • JOHN ROMER

The Defense Systems Management College Alumni Association recently added a new chapter in Southern Maryland, which is building on the past to form a unique service for the future. By FY 99, the Patuxent River Naval Air Station, Md., billets will grow to about 7,000+ from about 3,000+ in FY 89. The Southern Maryland chapter's main goal is to provide a forum for those members of the professional acquisition workforce already in place or relocating to Patuxent River, to openly exchange ideas for streamlining and enhancing acquisition of defense systems.

The Association chapter comes when Patuxent River, home of the Naval Air Warfare Center (NAWC) Aircraft Division, is undergoing a major expansion—the result of the Base Realignment and Closure decisions. Its parent command, the Naval Air Systems Command (NAVAIR), is consolidating the bulk of its Research, Development, Test and Evaluation (RDT&E), and Acquisition Command capabilities into two divisions: the NAWC Aircraft Division on the East Coast, and the NAWC Weapons Division on the West Coast.

The consolidation brings to Patuxent River, research and development from Warminster, Penn., including aircrew systems, aerospace materials laboratory, avionics, systems integration, and



air frame structures. From Trenton, N.J., comes propulsion RDT&E; and Indianapolis, Ind., provides program management support. Ship-shore elec-

tronics engineering will be added from St. Inigoes, Md., to the existing Patuxent River aircraft test, evaluation, and logistics capabilities. The NAVAIR

Maday is president of the Defense Systems Management College Alumni Association (DSMCAA), Southern Maryland Chapter, a Director at Large for the DSMCAA National Chapter, and Program Management Support Department Head, Naval Air Warfare Center Aircraft Division, Patuxent River, Md. He is a graduate of PMC 89-3, DSMC. Romer is a Public Affairs Specialist, Naval Air Station Patuxent River, Md.

headquarters brings command, contracts, engineering, logistics, as well as Program Executive Offices, Program Manager Air programs, and program management functions.

Naval Air Systems Command Reorganizes

All elements within the Naval Air Systems Command-NAVAIR headquarters, NAWC Aircraft Division on the East Coast, NAWC Weapons Division on the West Coast, Training Systems

Division (Orlando), and Naval Aviation Depots-have been reorganized into a Competency Aligned Organization to meet downsizing and cost reductions mandated by the Department of Navy. Under the new structure, all employees and resources are aligned into appropriate competencies within the Naval Aviation Systems TEAM.

A Competency is defined as a major organizational element composed of

A CONSTRUCTION REPORT

Five major new buildings have been or are being constructed at the Patuxent River Naval Air Station in Southern Maryland to accommodate Naval Air Systems Command consolidation efforts. Several buildings on station also have been renovated to allow for the expansion of nearly 3,000 military, civil service, and contractor billets to be relocated to Patuxent River between now and FY 99.

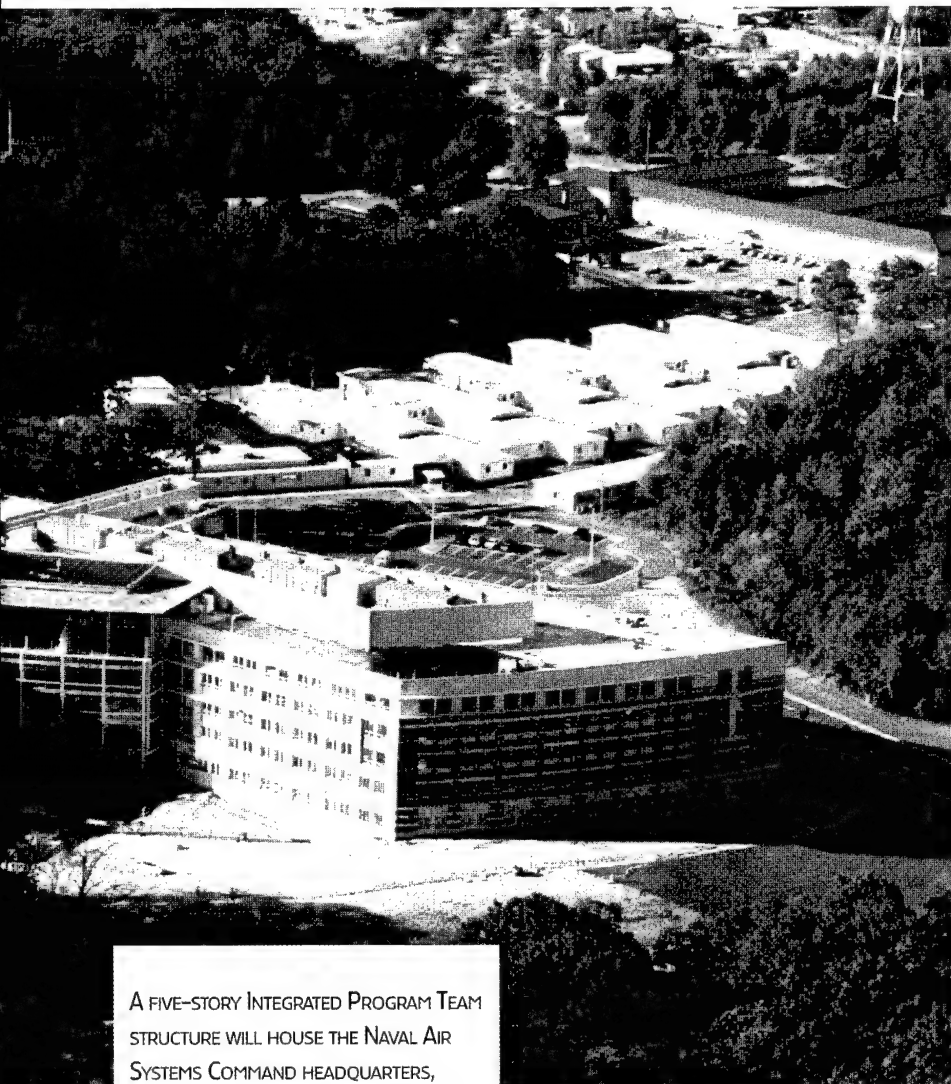
The Aircraft Technologies Laboratory was dedicated in the spring of 1995 as the Robert N. Becker Technical Center. It consists of 23 state-of-the-art laboratories. The facilities provide a capability for the complete synthesis and characterization of existing and advanced materials and new materials concepts. It includes polymers, composites, and coatings laboratories.

A North Engineering Center, opened this spring, is a 250,000-SF modernistic facility that houses 450 scientists and engineers developing and integrating software for fleet support aircraft. It supports Advanced Anti-Submarine Warfare software and avionics-sensors development.

And, in the South Engineering Center, 900 scientists and engineers will research and develop tactical air vehicles, avionics, aircrew systems, and aircraft computer systems. The 450,000-SF Center was occupied this past fall.

Construction began this spring on the Propulsion Systems Evaluation Facility and is scheduled for completion in December 1997. The facility will house the Naval Air Warfare Center Aircraft Division's propulsion testing of engine accessories and aircraft engine systems. This will include an accessories test area, helicopter transmission test area, unmanned aerial vehicle propulsion test area, fuels and lubricants test facilities, and a rotor spin facility that will enable engineers to evaluate the rotating components of gas turbine engines. About 120 engineers and technicians will work in the one-story, 78,000-SF building.

A five-story Integrated Program Team structure will house the Naval Air Systems Command headquarters, which is relocating from its current facilities in Crystal City, Va., to Naval Air Station Patuxent River. The 460,000-SF building, scheduled for completion in February 1997, will accommodate 2,200 employees.



A FIVE-STORY INTEGRATED PROGRAM TEAM STRUCTURE WILL HOUSE THE NAVAL AIR SYSTEMS COMMAND HEADQUARTERS, WHICH IS RELOCATING FROM ITS CURRENT FACILITIES IN CRYSTAL CITY, VA., TO NAVAL AIR STATION PATUXENT RIVER, MD. THE 460,000-SF BUILDING, SCHEDULED FOR COMPLETION IN FEBRUARY 1997, WILL ACCOMMODATE 2,200 EMPLOYEES.

people with a particular discipline who have the training, education, experience, facilities, equipment, and processes necessary to satisfy program and other customer demands. The supply of talent within these competencies is then matched with demand

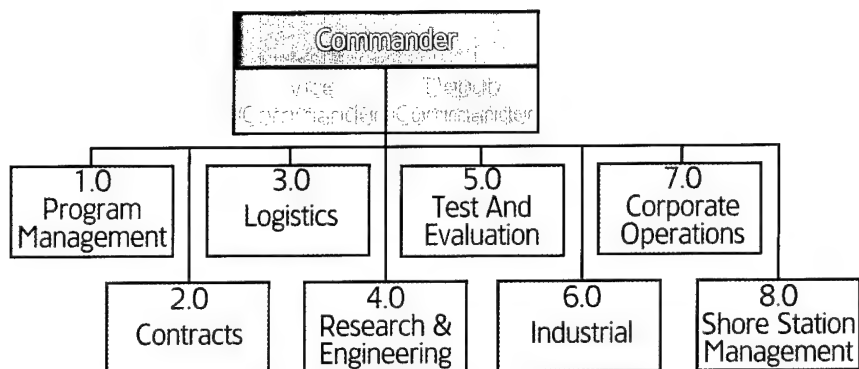


Figure 1. **An Integrated Product Team Supported By All Eight Competencies**

through a customer-driven process. The customer defines their work, and a team is assembled from the expertise resident in the competencies to quickly and efficiently satisfy customer needs. Figure 1 shows eight TEAM competencies.

Teaming Emphasized

The focus of the new Navy Organization is to define common processes and policies across all sites rather than concentrate on functional and geographical areas. The new business philosophy is to promote a totally integrated team for each program (Figure 2). The competencies will provide qualified people, facilities, and equipment to teams that will perform the work. The teams, in turn, produce or support the production of the products and services for the customer. The employees return to their competencies for technical support, new assignments, and additional training.

Competency managers provide supervisory functions, such as training recommendations, skills certifications, and establishment and communication of common methods and business processes.

The situation is unique in that for the first time, NAVAIR will collocate all the principal agencies and program offices on the East Coast at two sites: Naval Air Station Lakehurst, N.J., and Naval Air Station Patuxent River, Md.

The teaming among developers, testers, and managers is going to be highly integrated and focused on product development and acquisition. In that vein, the DSMCAA Southern Maryland Chapter will provide a tremendous opportunity to help with this bonding, pulling people from various competencies with a specific area of interest, creating an environment to discuss acquisition management reform. The chapter will also provide to members who cannot attend formal management classes, the opportunity to learn methods of more efficient procurement.

Reaching Our Audience

The Southern Maryland Chapter of the DSMCAA now holds monthly "brown bag" lunches that serve as a forum for the exchange of ideas. Guest speakers, who are experts in the procurement profession, share informa-

tion on various acquisition management reform topics as they relate to Naval affairs. Feedback from three earlier brown bag lunches, hosted by the Southern Maryland DSMCAA Chapter, has been positive.

The first brown bag focused on DSMCAA, and what it can do for people. The second concentrated on earned value, and the third described the impact of the new DoD 5000 changes to Navy Acquisition Category III/IV programs. The lunches are open to all interested, and training credit is provided to those signing the attendance list. One advantage of membership is that it offers an opportunity to recommend topics for future brown bag lunches.

The Southern Maryland Chapter also had the opportunity to participate and solicit acquisition reform feedback following a May 31, 1996, Acquisition Reform Acceleration Day held throughout DoD, as directed by the Office of the Under Secretary of Defense (Acquisition and Technology).

The DSMCAA Southern Maryland Chapter meetings, in effect, attempt to reach three basic audiences: the traditional Patuxent River engineers/scientists—people who have worked in the test and evaluation environment, but have never had the opportunity to get into and comprehend what acquisition/acquisition reform issues were all

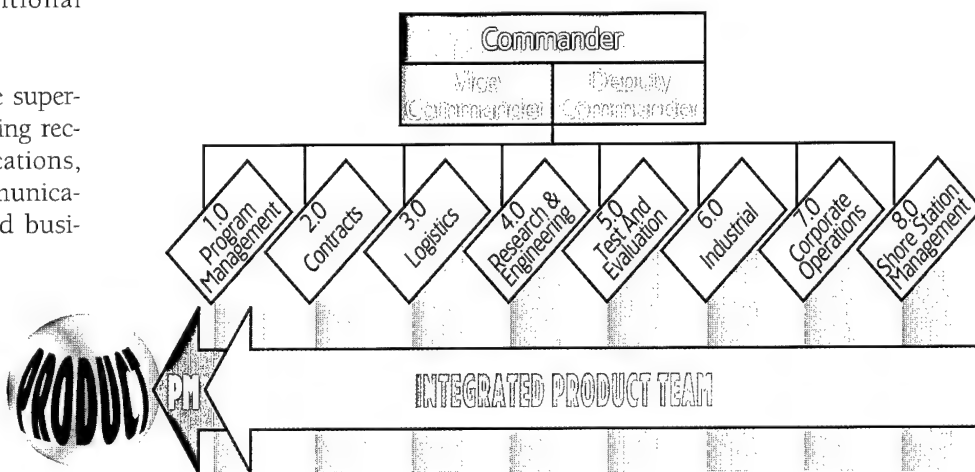


Figure 2. **Naval Air Systems Command Organization**

about. The second group is the support contractors—personnel who support NAWC Aircraft Division programs and who will be in need of such information to maintain proper communication links. Finally, the third group includes personnel at St. Inigo, Lakehurst, and those relocating to Patuxent River as a result of the Base Realignment and Closure decisions who wish to stay abreast of acquisition reform issues and also meet Patuxent River personnel who are interested in exchanging ideas on streamlining and enhancing acquisition of defense systems.

Naval Aviation at the Forefront

The DSMCAA provides an opportunity for all participants to gain access to information concerning changes that are occurring in acquisition philosophy and to develop an important networking capability with those who are interested in the same areas of specialty. An important group that will be extremely interested in touching base with DSMCAA and keeping up to date on acquisition/acquisition reforms is the NAVAIR program managers and program officers who ultimately control how programs are implemented. Portions of NAVAIR have already relocated to Patuxent River, with the total move to be completed by September 1997.

"With the help of organizations like the DSMCAA, the potential exists to put together a model that will really streamline acquisition," said Navy Capt. Rory Fisher, Head, Program Management Competency (1.0) for the Naval Air Warfare Center Aircraft Division.

The Alumni Association will help carry Naval aviation to the forefront of "Principal Site Aviation Acquisition" at Patuxent River by acting as a bridge between acquisition reform policy makers and the field activity personnel who implement these directives. Restructuring will provide for a better and more efficient means of product acquisition while producing a more competent workforce.

Anita Jones, DDR&E, Announces

TWO KEY APPOINTMENTS

Anita K. Jones, Director of Defense Research and Engineering (DDR&E), Department of Defense, recently announced two new senior leadership position appointments to her Pentagon staff: Dr. Ann Miller and Dr. Clarence W. Kitchens, Jr.

Miller is a newly appointed Senior Executive Service member, and is serving as the Director for Information Technologies. She brings a wealth of knowledge and expertise to the DoD from her extensive and exceptional experiences at Motorola, Inc., and academia.

Kitchens, an experienced federal Senior Executive Service member, former Director of the U.S. Army's Benet Laboratories, and an internationally recognized weapons technology expert, became the Director for Weapons Technologies. He brings extensive experience as a researcher, project leader, and manager of weapons science, technology, and development programs and organizations.

According to Jones, both individuals will play a key senior leadership role in the DoD's science and technology program. The appointments were effective January 5, 1997.

ATTENTION

GOVERNMENT EMPLOYEES!

Fax Us Now to Receive Popular DSMC Guidebooks

Receive popular DSMC guidebooks, free of charge, by faxing the Defense Automated Printing Service, Defense Logistics Agency, Attn: Jeff Turner (Comm: 703-805-3726; DSN 655-3726). Be sure to put your request on official stationery.

Joint Logistics Commanders Guidance for Use of Evolutionary Acquisition Strategy to Acquire Weapon Systems

Modernization in Lean Times: Modifications and Upgrades

Scheduling Guide for Program Managers

Systems Acquisition Managers Guide for the Use of Models and Simulations

Test and Evaluation Management Guide

Our revised brochure on all available DSMC publications will be printed in mid-April 1997

ACE Accredits 10 DSMC Courses for Graduate or Undergraduate Credit

JACK DWYER

Good news for past, present, and future students of the Defense Systems Management College! The American Council on Education (ACE) completed their evaluation of 15 DSMC courses for college credit during the week of October 28, 1996. The Council recommended 10 of the courses either for undergraduate or graduate credit hours. (Two courses, BFM102 and BFM 203, were counted as one course because both have to be taken before credit is recommended.)

On December 13, 1996, the Council notified the DSMC Commandant, by

letter, of the courses recommended for credit. Until the credits are published in the next issue of the ACE's *Handbook to the Guide to the Evaluation of Educational Experiences in the Armed Forces*, students requesting credits must request a transcript and copy of the Council's letter from the registrar.

For questions concerning the College's ACE accreditation, please call Jack Dwyer at (703) 805-5144/DSN 655-5144. To obtain a Transcript/Verification of Course Attendance Request, please fill out the Request (opposite page) or contact Dee Roberts in the DSMC Regis-

trar's Office at the following address, numbers, or fax:

DEFENSE SYSTEMS MGMT COLLEGE
ATTN REGISTRAR
9820 BELVOIR ROAD STE G38
FT BELVOIR VA 22060-5565

Comm: (703) 805-2850/2521
DSN 655-2850/2521

Fax: (703) 805-3983/3709
DSN 655-3983/3709

Editor's Note: Dwyer is the Director, Academic Requirements Department, Academic Programs Division, DSMC.

ACE RECOMMENDED CREDIT HOURS FOR DSMC COURSES

CURRENT COURSES OFFERED BY DSMC (See Notes 1 and 2)

DAU Course No.	Course Title	ACE Catalog DD No.	Dates Credit Valid	Undergraduate Credits	Graduate Credits	Specialty
ACQ 101	FSAMC	DD-1408-0012	9/94-Present	3 Lower Division	N/A	Acquisition Management
ACQ 201	ISAC	DD-1408-0020	6/92-Present	4 Upper Division	N/A	Acquisition Management
BCF 301	BCEFMW	DD-1408-0017	6/96-Present	2 Upper Division	N/A	Financial Management
BFM 102	CPMFC	DD-1408-0014	7/95-Present	3 Upper Division	N/A	Management (Both courses must be completed)
BFM 203	ICPMC	DD-1408-0015	3/96-Present			
PMT 302	APMC	DD-1408-0018	3/95-Present	N/A	9	3-Financial Management 3-Operations Management 3-Technical Management
PMT 303	EPMC	DD-1408-0019	8/94-Present	N/A	3	Program Management
PMT 305	PMSC	DD-1408-0021	6/96-Present	N/A	1	Program Management
PMT 341	SACPC	DD-1408-0009	1/90-Present	N/A	3	Procurement Management
PQM 301	APQMC	DD-1408-TBD	10/94-Present	N/A	TBD	Business Administration or Technical Management
SAM 201	ISAMC	DD-1408-0013	6/96-Present	3 Upper Division	N/A	Acquisition Management
SYS 301	ASPRDEC	DD-1408-0016	6/96-Present	N/A	3	Technical Management

COURSES STILL VALID FOR CREDIT BUT NO LONGER OFFERED (See notes 1, 3, 4, and 5)

PRD 301	DAEMQAC	DD-1408-0010	10/93-9/94	N/A	3	Business Administration or Technical Management
PMT 201	ISAC	DD-1408-0011	10/90-6/92	4 Upper Division	N/A	Systems Management
PMT 301	PMC	DD-1408-0007	2/90-3/95	2 Upper Division	9	2-Financial Analysis/Planning 3-Leadership/Group Decision Process 3-Systems Management 3-Operations Management
None	PMC	DD-1408-0002	1/73-1/90	6 Upper Division	9	3-Production and Operations Management 2-Managerial Finance 1-General Management 9-Program or Project Management

NOTES:

(1) Shaded Courses were part of 1996 ACE Review and thus are not contained in the most recently published 1994 ACE Guide. All unshaded courses are contained in the 1994 ACE Guide. College/university admissions officers may either review the ACE Guide (for older courses) or telephonically contact ACE (for newer courses) at (202) 939-9470 for verification of credit recommendations

(2) BFM 102 and BFM 203 must both be completed to receive credit hours.
(3) PQM 301 replaced PRD 301 and is being reviewed for credit
(4) PMT 201 was replaced by ACQ 201
(5) PMT 301 was replaced by PMT 302.

PLEASE COMPLETE **ALL** AREAS
DEFENSE SYSTEMS MANAGEMENT COLLEGE

TRANSCRIPT/VERIFICATION OF COURSE ATTENDANCE REQUEST

(PLEASE PRINT LEGIBLY OR TYPE)

<input type="checkbox"/>	OFFICIAL TRANSCRIPT (Available For APMC/PMC Only)
<input type="checkbox"/>	MAIL TO: _____ _____ _____
<input type="checkbox"/>	FAX TO: Comm _____ DSN _____

<input type="checkbox"/>	VERIFICATION OF ATTENDANCE (Available For All Courses)
<input type="checkbox"/>	MAIL TO: _____ _____ _____
<input type="checkbox"/>	FAX TO: Comm _____ DSN _____

REQUESTER/
STUDENT NAME: _____ SSN: _____
(INCLUDE MAIDEN NAME IF APPLICABLE)

ADDRESS: _____ PHONE: _____
(COMMERCIAL)

PHONE: _____
(DSN)

PLEASE COMPLETE THE FOLLOWING FOR **EACH** COURSE:

COURSE TITLE: _____
COURSE NUMBER/OFFERING: _____
WHERE WAS COURSE TAKEN? _____
DATES COURSE WAS TAKEN: _____

NOTE: Any additional information you are able to provide will be of great assistance in processing this request.

AFTER COMPLETION MAIL TO:
DEFENSE SYSTEMS MANAGEMENT COLLEGE
ATTN REGISTRAR
9820 BELVOIR ROAD STE G38
FT BELVOIR VA 22060-5565

OR FAX TO: Comm (703) 805-3983/3709
DSN 655-3983/3709

PLEASE ALLOW TWO (2) WEEKS FOR PROCESSING.

**SHOULD YOU HAVE ANY QUESTIONS, PLEASE CALL
DSN 655-2850/2521 OR COMMERCIAL (703) 805-2850/2521.**

PRIVACY ACT STATEMENT: AUTHORITY: 10 USC 8012; E.O. 9397. PRINCIPAL PURPOSE: To request mailing of student's official DSMC transcripts. **ROUTINE USES:** To authorize transmittal of official transcripts to agencies designated by student. Faculty and Staff of DSMC and other federal agencies having a need to know may refer to this record in the performance of their official duties. SSN is used to make positive identification of individual and record. **DISCLOSURE:** Voluntary; however, failure to provide the information will result in the designated agency not receiving transcripts as requested by the student.

STUDENT SIGNATURE: _____ DATE: _____

Seed Money Available to Develop and Prototype National Space Reconnaissance Data Capabilities

How MERIT Can Help Your Program

CAPT. ALICIA GRAHAM, USAF

The JCS Joint Vision 2010 highlights the concept of gaining "dominant battlespace awareness"—a clear picture of friendly and enemy operations within a theater. To implement this vision, each of the Services is building weapon and support systems that are hungry for intelligence and reconnaissance data from space. Without constant updates, many of these systems are less effective. With timely, accurate intelligence data, they provide the information necessary to give us the advantage on air, sea, and land. Any way you slice it, reconnaissance and surveillance information provided by National Reconnaissance Office (NRO) systems are becoming a necessary ingredient for most programs.

The Military Exploitation of Reconnaissance and Intelligence Technology (MERIT) program provides seed money to develop and prototype capabilities that increase the utility and accessibility of national space reconnaissance data for the tactical operator. The most successful MERIT projects involve P³I (Preplanned Product Improvement) for ongoing programs, rather than attempt a new start. For that reason, MERIT is looking for good ideas from program offices on how to better utilize national reconnaissance data in their systems to meet mission requirements.

MERIT History

In 1982, Deputy Secretary of Defense, Frank Carlucci, initiated the MERIT program under the Defense Reconnaissance Support Program (DRSP). MERIT's purpose was to "examine and demonstrate technologies and methods that would improve the application of reconnaissance systems to military operations." In 1994,



CORONA SATELLITE
IMAGE OF THE SARY
OZEK IRBM COMPLEX,
USSR, SEPT. 17, 1971.
Photo courtesy National
Reconnaissance Office

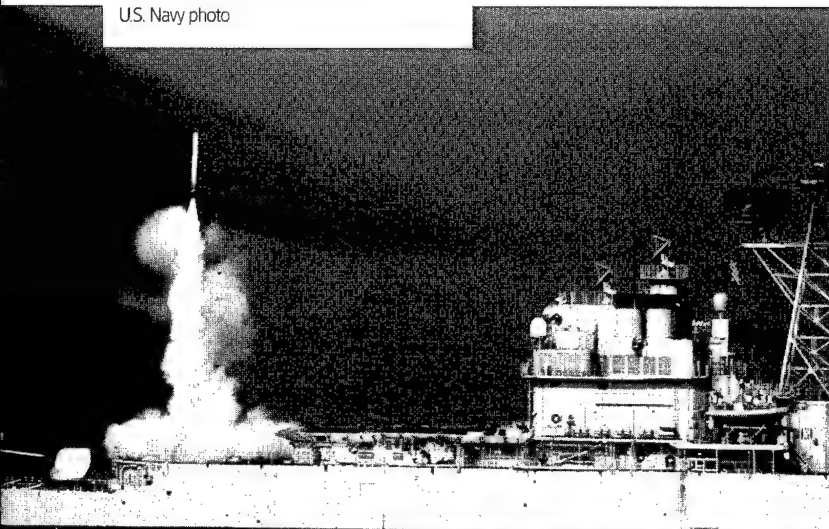


E-8C JOINT STARS U.S. Air Force photo

Graham is the MERIT Program Monitor and a member of the National Reconnaissance Office Military Support Staff within the Defense Support Project Office, specializing in advanced technology insertion. Her professional experience includes engineering, acquisition, and intelligence analysis.

A FIRST STRIKE TOMAHAWK MISSILE IS LAUNCHED FROM THE AFT SECTION OF THE U.S. NAVY'S TICONDEROGA CLASS CRUISER U.S.S. SHILOH (CG 67), ON THE MORNING OF SEPT. 3, 1996.

U.S. Navy photo



the DRSP became the Defense Space Reconnaissance Program (DSRP), narrowing MERIT's focus to space reconnaissance improvements. Over the years, MERIT has funded many successful projects that have been integrated into military operations, includ-

Is MERIT For You?

If your program has requirements for national space data or for data derived from national intelligence assets, such as mapping, targeting, or point positioning products from the National Imagery and Mapping Agency (NIMA) or Defense Intelligence Agency (DIA), it may be a candidate for participation in MERIT. MERIT funds research and development prototyping (related to the use of national data in your system) with all its inherent risks. Since MERIT takes the financial risk, your program does not have much to lose and very much to gain by looking into MERIT.

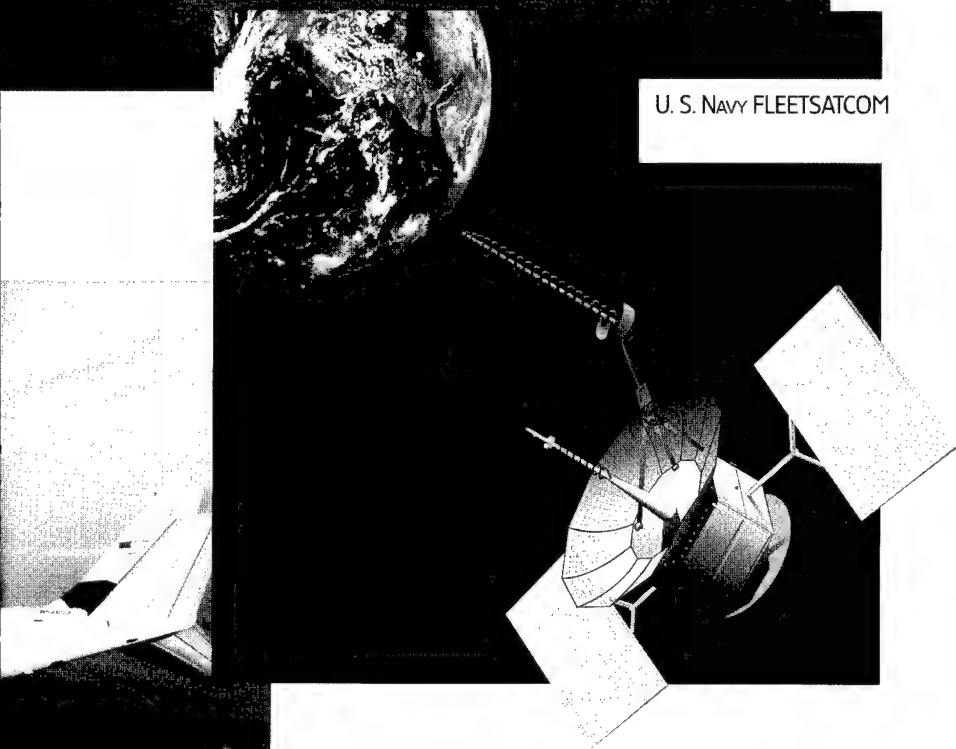
Success Stories

Due to the nature of the MERIT Program, many success stories are classified. However, many are not. For example:

Joint STARS. The Joint STARS Program Office and Special Projects Directorate at Hanscom Air Force Base, Mass., successfully demonstrated software to improve the positioning accuracy of Joint STARS using national satellite imagery. The Joint STARS Imagery Geolocation Improvement (JIGI) program modified an imagery exploitation tool, originally developed for intelligence community use, to accept Joint STARS radar imagery. The tool performed automatic registration of the aircraft imagery to the more accurate national systems. After registration was complete, features and targets in the airborne imagery were located to nearly the same degree of accuracy as in the national imagery (often an order-of-magnitude improvement). MERIT funded the installation of JIGI on-board the Joint STARS test contingent's aircraft as a proof-of-concept, for Contingency Operations and exercise participation. MERIT is also funding the adaptation of this technology for use with the U-2R/S, P-3, AC-130U, and the Predator, Global Hawk, and Darkstar Unmanned Aerial Vehicles.

HAYFIELD. The HAYFIELD software-programmable, cryptographic, multi-

U. S. NAVY FLEETSATCOM



ing: the Joint Stars Imagery Geolocation Improvement program, the TRAP (Tactical and Related Applications) Data Dissemination System that distributes intelligence data via UHF SATCOM, and the National Imagery Transmission Format (NITF).

chip module (MCM) also originated in MERIT. HAYFIELD eliminates the hassle of bringing authentication codes into the field, which are classified and need to be secured. HAYFIELD provides up to four channels of independent and simultaneous data decryption, while reducing size, weight, and power requirements. It is reprogrammable to facilitate the periodic algorithm changes required to meet security requirements, and has the means to implement additional algorithms as needed. HAYFIELD will be installed in tactical radios such as the Army's Commanders' Tactical Terminal, U.S. Special Operations Command's Multi-mission Advanced Tactical Terminal (MATT), and the Advance Secure Digital Radio. The National Security Agency (NSA) manages the current production of HAYFIELD chips.

ANVIL. MERIT partially funded the development of the ANVIL image classifier for detecting targets in multispectral imagery, including Landsat and SPOT, in near-real time. This process operates at a sub-pixel level,¹ enabling detection and identification of targets too small to be seen by the human eye. ANVIL will be incorporated into Eagle Vision, a transportable receive and processing system for live commercial imagery in support of aircraft mission planning.

RADIANT MERCURY. RADIANT MERCURY performs automated sanitization and downgrading of outgoing, classified, tactical messages. The MERIT effort focused on automatically downgrading national imagery. These functions are performed by using an operator-modifiable rules set, which governs if and how formatted message data are modified, and to which communications lines the messages may be released. RADIANT MERCURY has been accredited by NSA for operational use.

New Programs

National Eagle. National Eagle is modifying the Office of the Secretary of Defense/U.S. Air Force Eagle Vision deployable commercial imagery

ground station to integrate national and commercial imagery. This modification and integration will ultimately help build the DoD standard products needed to feed "three-D fly through" mission planning systems. The products have been used for mission planning and rehearsal at Aviano Air Base, and Vicenza, Italy, by the 1st Armored Division in Tuzla, and at the Dayton-Bosnia Peace Conference. They will be combined into a NIMA relational digital database.

Time-critical Targeting. Time-critical Targeting's objective is to improve the responsiveness of the TOMAHAWK cruise missile by integrating the use of other sources of national imagery to its mission planning system. The ability of the TOMAHAWK mission planning system to use alternate-source imagery increases reference material availability, improving performance against time-critical targets by an order of magnitude.

Terrain Extraction of National Imagery. MERIT is funding the Army Space Program Office to adapt terrain extraction algorithms to accept a combination of airborne and national imagery in the Enhanced Tactical Radar Correlator (ETRAC) image processing van. These algorithms may provide ETRAC operators with alternatives in obtaining high-resolution Digital Terrain Elevation Data (DTED) in theater. High-level DTED is available only for a small portion of the earth's surface.

Spatial Image Prescreening Program (SIPP). SIPP's value is its potential to accurately screen large quantities of imagery in a short time. SIPP is developing software that automatically screens all types of imagery for target detection/discrimination purposes and to build specialized acceleration hardware that improves processing time to seconds or fractions of a second. The process combines morphology with fractal theory, resulting in extremely fast computational speeds that may be able to support tactical military operations. Fractals have long

been recognized for their capability to distinguish manmade targets in nature, but their required processing time made them impractical for near-real-time military requirements.

MERIT Criteria

MERIT funding is awarded on a competitive basis each year. The funds are defense-wide research, development, test and evaluation.² Funds in this category are used for "Advanced technology development which is used to demonstrate the general military utility or cost reduction potential of technology when applied to different types of military equipment or techniques," for valid military requirements.

In addition to restrictions placed on MERIT dollars by the DoD FMR, there are a few other criteria that all MERIT projects must meet in order to be considered for funding:

- Improvement of national space reconnaissance contributions to tactical operations.
- Joint Services' application (i.e., the technology proposed must have some use to more than one Service).
- Near-term (one to two years') employment of project results.

Summary

With the recent removal of security constraints on the uses of national space data, the opportunities are greater than ever before to exploit NRO data in new and innovative ways. MERIT's role is to help open those doors of opportunity by improving weapon system performance and ultimately benefiting those in harm's way. MERIT can improve your program's use of national space data or introduce the use of national data into your program for the first time.

ENDNOTES

1. A pixel is a picture element, the smallest element into which an electronic image can be encapsulated.

2. DoD Financial Management Regulation 7000.14-R, Chapter 5, Research Category 6.3a.

MERIT proposal submitters must be U.S. government personnel, have at least a SECRET clearance, and be prepared to present a briefing on their proposal to the MERIT Working Group. Each briefing will be presented in Washington, D.C., during the summer of the year the proposal is submitted. The MERIT Working Group consists of representatives from the Services, National Security Agency, Defense Intelligence Agency, Joint Staff, National Imagery and Mapping Agency, and U.S. Special Operations Command.

Proposals for the FY 98 cycle are due in May 1997. They must be submitted to the Defense Support Project Office (DSPO) through sponsorship by a MERIT Working Group member. The MERIT Working Group will review the proposals and make recommendations for funding to the Deputy Director, DSPO by September 1997. Dissemination of funding documents should follow in November or December.

To receive a copy of the preparatory instructions, please call or fax anyone on the Points of Contact (POC) list. If you wish to be included on the addressee list for future MERIT announcements, please fax or E-mail your electronic plain language message address or fax number to the DSPO POC.

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DIA

Maj. Tom Taylor, U.S. Air Force .

Quality Leadership as Maneuver Warfare

A Method of Instructing and Implementing "Total Quality Leadership" in the Armed Forces

MAJ. RICHARD STUART MALTZ, USARNG

Quality, as it is understood in the context of the teachings of Dr. W. Edwards Deming (often referred to as "Total Quality Management" [TQM] or "Total/Army Quality Leadership" [T/AQL]), is in trouble in the U.S. Armed Forces today.

Law or Lip Service?

Not, properly speaking, a doctrine, but rather, an all-encompassing culture of productivity; "Quality Leadership" has been demonstrated to be a superior method of synergistically harnessing the human resources of any organization to better accomplish its missions. It has been endorsed by the Executive Branch of the Federal Government, mandated by Congress, and adopted by the Department of Defense and the various Services. Yet, in spite of the usually forceful, dedicated, competent, and creative efforts undertaken to promulgate it within the armed forces, it is being rejected by many of the middle- and lower-level leaders whom it is principally designed to benefit.

The reasons for this rejection are many and varied. They include the notion that this is but the most recent of a series of leadership "fads," and that it can safely be depended upon to disappear if ignored. Some imagine that they are already "doing" *Quality*. Many are skeptical that *Quality* can really work as advertised. Some fear that it is



U.S. MARINES FROM KILO COMPANY, 3RD BATTALION, 8TH MARINE REGIMENT, 2ND MARINE DIVISION, BEGIN TO FORM A PERIMETER AFTER UNLOADING FROM AMPHIBIOUS ASSAULT VEHICLES IN LANDING ZONE HAWK, CAMP LEJEUNE, N.C., ON MAY 10, 1996.

an invitation to anarchy. Others fear risk to their careers and their personal status resulting from such an ambitious "paradigm shift." Many feel that the present system is "good enough," and (in the absence of a crisis) there is no compelling reason to change.

The most prevalent and deep-rooted reason for this rejection is based on the fact that many cannot envision how the principles of *Quality* can be incorporated into, or even made compatible with, their roles as service-members. They see *Quality* as a culture for the office or factory,

completely alien to their needs and duties, particularly on the battlefield. They see *Quality* as being inherently "unsoldierly."

Quality instructors, having little or no knowledge of any history of the appli-



Maltz, an intelligence officer in the U.S. Army National Guard, is the Director of the Military Quality Institute, Oakton, Va. The Institute is a small, private, nonprofit, educational foundation, founded specifically to reconcile "quality" theory (particularly "Deming theory") with military theory, and to use military history for benchmarking purposes.

cation of *Quality* on the battlefield, are ill-equipped to address these objections. In the absence of being able to transmit the principles of *Quality* in military terms that servicemembers

middle- and lower-level leaders are necessarily experts at appearing to support plans that they, in fact, do not (and because they tend to outlast their superiors), this approach is also doomed.

In short, in the absence of the adoption of an expedient that will effectively and thoroughly persuade servicemembers at every level that *Quality* is not merely compatible with soldiering, but will actually enhance their ability to "soldier," *Quality* in the armed forces will unavoidably, yet needlessly, fail.

Talk the Soldier's Language

The only expedient that can remedy this, that can bridge the gap between hearing and understanding, that can translate the ideas that underlie *Quality* into a language that every servicemember can comprehend and appreciate, is the "doctrine" of "Maneuver Warfare" (a term used, in this context, by the U.S. Marine Corps and, more recently, by the U.S. Navy).

Students of military history have noted and studied that "culture" of military organization, administration, logistics, training, and operations known as "Maneuver Warfare Doctrine." This doctrine was initially developed and refined by Prussia/Germany between 1808 and 1945; and was subsequently adopted in its entirety by Israel, which has practiced it since its re-emergence as an independent nation in the late 1940s. Other countries have also adopted it, as well as two branches of our armed forces—the U.S. Marine Corps and U.S. Navy. However, Germany and Israel are the only two countries for which extensive data pertaining to its use in combat are available.

"Maneuver Warfare" has been demonstrated, through sophisticated models of quantitative analysis, to be consistently significantly (20 percent or greater) more combat effective than the "Methodical Warfare Doctrine" developed by France in World War I, and subsequently adopted and refined

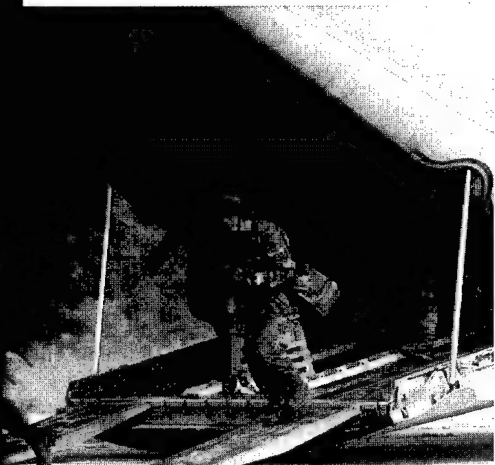
by many other countries, notably the United States. (The U.S. Army, until recently, practiced it in the incarnation "AirLand Battle.")

Not Merely A Doctrine

Students of both military history and "Quality Leadership," have been impressed by the striking similarities between *Quality* and *Maneuver*.

- Each can be better understood through study of the other.
- Each is an entire culture (indeed, the same culture), not merely a doctrine.
- Each views leadership as an art more than a science.
- Each is more a way of thinking about problems than a rote formula for solving them.
- Each is based upon an understanding of "Profound Knowledge" (theories of knowledge, systems, psychology, and variation in *Quality*; and maneuver theory, combined arms theory, military psychology, and military history, in *Maneuver*).
- Each is designed to maximize productivity (combat effectiveness) by more fully (synergistically) utilizing the human resources of an organization.
- Each is based upon driving "fear" (narrow self-interest, careerism) out of the decision-making process in favor of a broader appreciation (of organizational "Purpose" in *Quality*, and the "Commander's Intent" in *Maneuver*).
- Each is based upon using decentralization of the decision-making process to remove systemic barriers to initiative, creativity, and maximum performance, and to thereby unleash the full potential of the individual ("Empowerment" in *Quality*, and "Auftragstaktik," or "Mission-Oriented Tactics" or "Mission Orders," in *Maneuver*).
- Each is based upon speed (timely service to the customer in *Quality*, and tempo of operations in *Maneuver*).
- Each is based upon focus of attention on key individuals (serving the customer as opposed to the system

MEMBERS OF COMPANY 4 EXIT A U.S. AIR FORCE C-130 HERCULES AT DAVIS AIRFIELD DURING AN AIRFIELD SECURITY, CONVOY OPERATIONS, AND HUMANITARIAN ASSISTANCE FINAL TRAINING EXERCISE AT CAMP LEJEUNE, N.C., ON AUG. 24, 1996.



U.S. MARINE OFFICERS REVIEW THEIR PERIMETER SECURITY AT A SIMULATED U.S. EMBASSY IN THE FICTITIOUS COUNTRY OF PACIFICA DURING A NONCOMBATANT EVACUATION OPERATION EXERCISE ON JUNE 11, 1996, AT KANEOHE BAY, HAWAII.

can understand and appreciate, instructors might as well be teaching in a foreign language. Similarly bereft, upper-level leadership is resorting to simply insisting upon the full implementation of *Quality* in the hope that those who practice it, even under compulsion, will eventually accept and appreciate it. Because compulsory *Quality* is an oxymoron, and since

in *Quality*, and neutralizing the enemy as opposed to seizing terrain in *Maneuver*).

- Each is based upon identifying and addressing key problems in order of criticality (using analytical models in *Quality*, and the principle of “Schwerpunkt,” or “Focus of Effort,” in *Maneuver*).
- Each is based upon identifying and accomplishing that which is most readily done first (again using analytical models in *Quality*, and the principle of “Flachen und Lucken,” or “Surfaces and Gaps,” in *Maneuver*).
- Each emphasizes continuous (cyclical) improvement and innovation (using the models of the Shewhart Cycle¹ in *Quality*, and the Boyd Cycle² in *Maneuver*).
- Each eschews rigid dogma.
- Each offers (and delivers) otherwise unimaginable increases in productivity/combat effectiveness.
- To most cheaply, quickly, and surely achieve control over any situation involving the dynamics of human interaction (which includes all work and all warfare), each focuses its attention on, and tailors its efforts to, the underlying “causes” of all human behavior: the mind and will, rather than needlessly wasting resources directly engaging the (after) “effects” (the results of a systemic problem in *Quality*, and enemy main/combat force deployments in *Maneuver*).

The parallels are limitless. Each is a direct analog of the other, differing mainly in the environment for which it was designed (civilian in *Quality*, and military in *Maneuver*).

A Brief History

“Maneuver Warfare Doctrine” was initially created by Prussia following the destruction of its army at the hands of Napoleon in 1806. It was developed by Prussia/Germany and adopted by Israel because both countries realized that they were surrounded by enemies, each of which was stronger than they were. They realized that, due to adverse objective circumstances, if they were to be competitive with their

adversaries (militarily viable) they could not afford battles of attrition. They would have to be faster and smarter (more efficient and more effective) than their enemies. They would have to render their enemies’ materiel superiority irrelevant through the application of superior doctrine. They would have to “fight outnumbered and win.”

Moreover, they realized that while the occurrence of individual military genius is always to be hoped-for, it can never be relied-upon. Accordingly, they sought (as the Romans did before them) to institutionalize excellence through the adoption of a system (culture) that was inherently superior in battle. The most spectacular examples of the success of this approach can be found in the fall of a militarily superior France to German arms in six weeks in 1940,³ and the collapse of the combined (and vastly superior) Arab forces in the face of Israeli arms after six days of combat in 1967. Empirical data derived from countless battles, campaigns, and wars fought throughout Europe, North Africa, and the Middle East, demonstrate conclusively that *Quality Leadership* (as *Maneuver Warfare*) is the most effective means of addressing the challenges of the modern battlefield.

Not Broken, But Room for Improvement

None of this is meant to imply criticism of the way we do things now. We have expert armed forces that employ a proven and effective doctrine (indeed, AirLand Battle Doctrine was a partial adaptation of the principles of *Maneuver* to the existing Methodical Warfare Doctrine). But *Maneuver*, like *Quality*, is a complete culture; it cannot be effectively adopted piecemeal and without the dislocations that necessarily accompany true paradigm shifts. Our current doctrine is not “broken” but, even “whole,” it may still be improved (better supported by our military culture).

Ours is an effective doctrine, but it is not as fully supported by our current

“Methodical” culture as it could be. A *Quality Leadership* (as *Maneuver Warfare*) culture could provide advantages in training, administration, logistics, and operations that would enable current doctrine to achieve its full potential on the battlefield. In the competitive world of tomorrow’s battlefields, we would not want to be like France in 1940 (objectively superior, yet still defeated).

Countries have two very different military forces: one for peacetime, one for war. These forces differ in size, structure, and most important of all, culture. For all of our talk of “train the way you fight” and “Battle-Focus,” we invariably train using “peacetime” techniques and standards. During mobilization and the early phases of war, we usually waste time and blood struggling to reorient ourselves to the inevitably different demands of war. This expensive process is, at its root, a cultural transformation. Wars often end before this transformation can be completed.

One of the principal objectives and benefits of the *Maneuver Warfare* culture is that it is successfully designed to eliminate the need for this change by already being thoroughly attuned to the real demands of war (just as *Quality* is attuned to the real demands of the marketplace). In the *Maneuver* culture, all considerations that do not pertain to warfighting are ruthlessly suppressed. The successful adoption of *Maneuver* culture therefore eliminates the peacetime culture, and the costs entailed in transitioning that culture to the needs of war. *Maneuver* employs the precepts of *Quality Leadership* to be truly prepared for the “come as you are” war (witness armies of Israeli reservists routinely crushing much larger armies of Arab regulars in days or weeks, after only 24 hours of mobilization).

Military Services Must Recognize the Need for Training

The discovery of the relationship between *Quality Leadership* and *Maneuver Warfare* has direct and dra-

matic implications for both military *Quality* and leadership-training programs; and through these, for everything else in the armed forces. In order to facilitate the realization of the potential of the existing *Quality* programs within the armed forces, and to maximize the benefit to be derived from the lessons learned by other countries in successfully adapting these principles to their armed forces, the various Armed Services should offer lectures, seminars, and workshops in the relationship between *Quality* Leadership and *Maneuver Warfare*, each as an analog of the other; essentially the same, but designed for different environments (one for business and industry, the other specifically for the military). They should conduct in-depth studies to document this relationship, and to thereby introduce a vocabulary and a method of teaching designed to make the precepts of *Quality* fully comprehensible in a military context.

It can then be demonstrated, through the use of empirical data derived from historical records (and some excellent analytical works that are already available), that *Quality* (in the form of *Maneuver*) is not only "soldierly," but also hugely effective in combat. They can use the results of these studies to create *Quality as Maneuver* curricula, with complete lesson plans, to supplement and complement existing *Quality* curricula, and to offer courses based upon these curricula and plans. This will provide a foundation for subsequent studies, curricula, and courses in the effective implementation of the culture of "Quality Leadership as Maneuver Warfare" in military units,

A Product Much Greater Than the Sum of Its Parts

Quality and *Maneuver* both already exist. This proposal however, relates and combines these two heretofore distinct disciplines in such a way that each may act as a catalyst that makes the other viable in a symbiotic synergy that will result in a product much greater than the sum of its parts. The fate of *Quality* in the armed forces is at

stake, and inasmuch as even a small increase in productivity/combat-effectiveness can easily spell the difference between victory and defeat (*Quality* and *Maneuver* theories both suggest a likely 20-percent or greater increase), and great empires are sometimes lost in single battles, the fate of the armed forces, and the nation, could ultimately hang in the balance.

Editor's Note: The author welcomes comments or further inquiries concerning this article. He may be contacted at:

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ENDNOTES

1. The Shewhart Cycle, sometimes known as the "Plan, Do, Check, Act" (or "PDCA") cycle; the "Plan, Do, Study, Act" (or "PDSA") cycle; or the "Deming Cycle" (in Japan), is a four-part, cyclic approach to problem solving and continual learning and improvement. It was developed by Deming's mentor, Walter Shewhart, in 1939, and was subsequently introduced by Deming to Japan in 1950.
2. The Boyd Cycle, sometimes known as the OODA loop (for Observe, Orient, Decide, Act), is a four-part cyclic approach to tactical problem solving and continual learning and improvement in combat. It was developed by U.S. Air Force Col. John Boyd to model patterns of fighter combat in Korea, and subsequently expanded to illustrate competitive situations in war at all levels and in all media.
3. This campaign was the third application of the German technique of "Blitzkrieg" or "Lightning War." It entailed the synchronization of artillery and air support assets to support the deep maneuver of concentrated armored and mechanized units spearheading the attack of larger infantry armies. In fact, the Blitzkrieg was the application of 1930s' technology (in the form of tanks, aircraft, and radios) to the German World War I doctrine of "Stormtroop Tactics." Blitzkrieg is therefore a manifestation

of *Maneuver Warfare* on the battlefield. It is dependent upon both technology and *Maneuver* culture to achieve its maximum effect. (By 1945, in the absence of *Maneuver* culture, none of the Allies were able to employ the same techniques with more than 80 percent of the effectiveness enjoyed by the Germans—they were able to mimic its form [technology, synchronization, concentration, etc.], but not its substance [*Quality*]).

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DSMC Alumni Association

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How would you like routine access to a group of speakers that includes the most influential names in the Department of Defense and industry? Or perhaps you're looking for career advancement, a change of pace, or a more challenging position in the defense industry or government acquisition workforce. It could be you want to broaden your circle of acquisition colleagues and business acquaintances through networking or symposia. You may even wish to take advantage of a large variety of elective courses taught at the Defense Systems Management College (DSMC) Fort Belvoir main campus, absolutely free of charge. You can have all this and more, by simply joining the DSMC Alumni Association or DSMCAA—a first-rate, world-class gathering of acquisition professionals, working actively with you and for you.

The Beginning

More than 60 DSMC graduates, representing virtually every Program Management Course, met at the College in October 1983 and established a DSMC Alumni Association. Army Brig. Gen. Benjamin J. Pellegrini welcomed the group and expressed the support of DSMC management. Joanne Barecca was elected as the first DSMCAA President. She remains a vital force in the Association.

Today, with a membership of over 1,500, the Association is headed by Wayne E. Glass, an ardent supporter and friend of the Defense Systems Management College. Working closely with Edward Robinson, immediate past president and current vice president of

"Being a member of the DSMC Alumni Association gives me the feeling that I am part of something big...I am participating with the people who influence, or, in some cases, generate the policy that is driving the professional acquisition community and its senior leadership..."

—Lyn Dellinger
Vice President for Membership
DSMC Alumni Association



the yearly Program Managers Symposium, Glass runs the Association with advice and counsel from elected officers, a board of directors, board of advisors, Service representatives, and a DSMC Liaison.

Improved Services for Membership
Annual Program Managers Symposium. Each summer, the Association

DSMC ALUMNI ASSOCIATION BOARD OF ADVISORS. FROM LEFT: AIR FORCE COL. (RET) TIM COURINGTON; NAVY VICE ADM. WILLIAM C. BOWES, PRINCIPAL DEPUTY ASSISTANT SECRETARY OF THE NAVY (RESEARCH, DEVELOPMENT, AND ACQUISITION); ARMY GEN. (RET) DONALD R. KEITH; ARMY COL. (RET) ED ROBINSON; ARMY BRIG. GEN. RICHARD A. BLACK, ALUMNI CHAIRMAN; ARMY LT. COL. (RET) WAYNE GLASS; AIR FORCE LT. GEN. (RET) BILL THURMAN; DAVID S.C. CHU; AIR FORCE LT. COL. (RET) CHUCK TRINGALI. NOT SHOWN: COLLEEN A. PRESTON, DEPUTY UNDER SECRETARY OF DEFENSE (ACQUISITION REFORM); AND AIR FORCE GEN. LAWRENCE A. SKANTZE.

Blanch is an editorial assistant to the managing editors of Program Manager magazine and Acquisition Review Quarterly journal. Johnson is managing editor, Program Manager magazine. Both work in the Visual Arts and Press Department, Division of College Administration and Services, DSMC.

DSMC ALUMNI ASSOCIATION BOARD OF DIRECTORS PRESENTS ARMY BRIG. GEN. RICHARD A. BLACK, DSMC COMMANDANT, WITH AN HONORARY MEMBERSHIP IN THE DSMCAA. FROM LEFT: JOANNE BARECCA, DIRECTOR; FRANK VARACALLI, VICE PRESIDENT OPERATIONS; BLACK; LYN DELLINGER, VICE PRESIDENT FOR MEMBERSHIP.



focus on using the latitude now offered and encouraged by the new DoD 5000 series and the tools now available in the new Defense Acquisition Deskbook.

As in past years, a select group of panels, workshops, and distinguished speakers will address current acquisition issues:

- Service Acquisition Executives Panel: Acquisition Innovation Results—Bottom Line
- The Acquisition Revolution in Being—Where Do We Go From Here
- Innovative Practices in Federal Acquisition—Implementing Federal Acquisition Reform Act (FARA) and Information Technology Reform Act (ITRA) '96
- Information Technology as a Tool for Innovation in Defense Acquisition



DSMC ALUMNI ASSOCIATION BOARD OF DIRECTORS. SEATED FROM LEFT: ED ROBINSON, IMMEDIATE PAST PRESIDENT AND CURRENT VICE PRESIDENT OF THE SYMPOSIUM; JOANNE BARECCA, DIRECTOR; WAYNE GLASS, PRESIDENT; LYN DELLINGER, VICE PRESIDENT FOR MEMBERSHIP; TEL CHARLAND, DIRECTOR. STANDING FROM LEFT: GARY WIMBERLY, DIRECTOR; PAUL BACKS, TREASURER; PAUL MCMAHON, DIRECTOR; FRANK VARACALLI, VICE PRESIDENT OPERATIONS; ARMY COL. WILLIAM E. KNIGHT, CHIP LINNEMAIER, SECRETARY.

sponsors a three-day symposium to provide an opportunity for graduates and faculty to renew acquaintances and update program management and acquisition skills.¹ This year's 14th Annual Program Managers Symposium will be conducted at the Defense Systems Management College, 5-7 May, 1997. Its theme will be "Implementing Innovative Practices in Defense Acquisition." The theme reinforces the current

- Congressional Update—Review of FARA, ITRA '96, et al
- Program Managers Panel: Innovation in Armed Services/Industry Acquisition Programs
- Full-day Workshops on Timely Acquisition Subjects

Industry Job Fair. About two years ago, the Association added a free job fair to its annual three-day Program

Managers Symposium on the last day. Back by popular demand, this year's job fair is scheduled for the afternoon of 7 May, 1430-1730. (Members need not register for the Symposium to attend the job fair.)

As in previous years, the Acquisition Expo (May 6-7) will feature Service and industry displays of acquisition reform initiatives as well as demonstrations of program management and engineering application tools currently in use throughout DoD. As of this writing, several government and industry displays are already on tap:

Government

- Defense Acquisition Deskbook
- Army Acquisition Corps
- Acquisition Center of Excellence
- Secretary of the Air Force/Acquisition Display
- Defense Logistics Agency Display
- Special Operations Acquisition Center Display

Industry

- BRTRC
- Anser Corporation
- HJ Ford
- MITRE—Collaborative Virtual Workspace (CVW)
- Welcom Software Technology
- C/S Solutions

This year's Acquisition Expo and job fair coordinator is Air Force Maj. Art Greenlee, a DSMC professor of Systems Acquisition in the Principles of Program Management Division. He may be contacted at: (703) 805-4987 or DSN 655-4987.

Membership Eligibility Extended.

The DSMCAA's constitution and bylaws now allow full "regular" membership to graduates of the DSMC's various executive and short courses as well as the College's premier course offering, the Advanced Program Management Course. This important move strengthens the Association.

Reduced Fees. Through a variety of initiatives, over the past year the Association reduced not only its membership

fees (from \$30.00 to \$20.00), but also the price of attending its yearly symposium (from \$275.00 to \$250.00).

Home Page. The Association now has its own DSMCAA Home Page on the World Wide Web:

<http://www.dsmcaa.org/dsmcaa>

Users can apply for membership, and current members can register for Symposium '97 as well as place their qualifications in a DSMCAA-sponsored career opportunities database. In addition to career opportunities, DSMCAA's Home Page also includes:

- Membership Information
- Association Activities
- Association Officers
- Membership Affiliations and Each Association's Upcoming Events
- Continuing Acquisition Education Opportunities
- Current News
- Calendar of Events
- Links to Government and Other Affiliated Home Pages

Access to DSMC Acker Library/Learning Resource Center. Formerly available only to DSMC students, faculty, and staff, Association members may check out resources over the weekend. The Library maintains an extensive collection of books, newspapers, journals, microfilm, and CD-ROM publications in the field of management, with special emphasis on defense systems acquisition management. The Learning Resource Center provides the opportunity for individual, self-paced training or refresher work in subjects related to acquisition management and professional development. It boasts a growing collection of about 4,000 training packages.

DSMC Electives. Space permitting, Association members can enroll in any DSMC elective course offered at the main Fort Belvoir campus, free of charge. According to Vice President for Membership and former DSMC faculty member, Lyn Dellinger, "Interestingly, I think the alumni people really add

to the electives. When they're present, they bring in new experiences and improve the electives...it's a real win-win situation for them and the College."

DSMC Alumni Quarterly Newsletter. This newsletter, published by DSMC professor Paul McMahon, keeps the Association membership informed of current happenings in the defense systems acquisition management field, special events of interest to members, and planned member activities.

Membership Affiliations. Another important advantage of DSMCAA membership is its membership affiliation with other professional acquisition organizations. According to Ed Robinson, "By affiliating ourselves with other professional acquisition associations, we are not only promoting the Alumni Association, but we are also cross-fertilizing our activities and knowledges with other organizations and making us visible to other organizations." The DSMC Alumni Association is currently affiliated with six professional acquisition organizations: National Council on Acquisition Professionalism (NCAP), National Contract Management Association (NCMA), Project Management Institute (PMI), American Project Management Forum (APMF), Performance Management Association (PMA), and Acquisition Reform Communications Center. The membership of all six organizations includes project, contract management, and acquisition professionals whose professional and technical interests parallel those of the DSMCAA membership.

The NCAP, the newest and perhaps lesser known of the six organizations, is an initiative that came out of the office of Steve Kelman, Administrator for the Office of Federal Procurement Policy. It seeks to play an important role in supporting the implementation of the National Performance Review recommendations related to the government's acquisition and acquisition-related activities.

Affiliating the DSMC Alumni Association membership with other professional acquisition organizations also affords members the opportunity to participate in several cooperative ventures, including:

- exhibits, seminars, and meetings (at member rates);
- a limited number of complimentary subscriptions to magazines, journals, and newsletters;
- recognition of educational programs for professional recertification credit;
- promotional advertising; and
- links to affiliated organizations through one another's home pages.

We're Not Through Growing

The Association recently added another chapter to its ranks: the Southern Maryland Chapter, Patuxent River, Md.² Other Association chapters include the Capital Area Chapter, Metropolitan Washington, D.C.; the Dayton Chapter, Dayton, Ohio; and the Tennessee Valley Chapter, Huntsville, Ala. Area chapters offer seminars, meetings, networking, and a forum for initiating member input to defense acquisition matters. DSMCAA stands ready to advise and assist members in other locations who want to start a local chapter.

DSMCAA Awards Program

The DSMCAA Awards Program seeks to recognize three constituencies: the members they serve, the directors who manage the Association's daily affairs, and the broader acquisition community.

USD(A&T) Packard Award. The Association currently works with the Office of the Under Secretary of Defense (Acquisition & Technology) to underwrite and share its "Packard Award" for innovative practices in defense acquisition. The award was established in honor of the late David Packard, former Deputy Secretary of Defense and Founder, Defense Systems Management College.

Acker Award. Given to the man or woman who has most influenced the course of acquisition innovation or

reform by his or her skill in communication.

President's Award. An engraved memento given annually by the President of the Board of Directors to a single member of the Board whose contributions have been most highly valued by the President.

Director's Award. This is an "MVP"-type award given to the Board of Directors member, chosen by vote of the full board, who is deemed the "most valuable player."

President's Gavel. A wooden gavel with engraved plate presented annually to the outgoing Association President in appreciation for his or her service.

"Friends of the Association" Awards. These are DSMCAA coins presented to limited numbers of people to recognize contributions "above and beyond."

DSMC 25th Anniversary

The Alumni Association continued its tradition of providing support to DSMC by funding the 25th Anniversary Celebration held at the DSMC, Fort Belvoir campus, June 25, 1996. The Association's financial support for the purchase of pins, cups, and other mementos, added greatly to the success of this event.

We Invite You to Join

From the Alumni Association's rich beginnings, it has worked hard to provide services that reflect the needs and concerns of the acquisition professional. The Program Managers Symposium is just one of the resources made available to Association members. You are invited to become a part of this fine organization, and the DSMCAA is looking forward to seeing all of you at the Symposium.

ENDNOTES

1. See DSMCAA 14th Annual Program Managers Symposium Ad, this page.

2. See "DSMCAA Welcomes Newest Chapter to Southern Maryland," this issue, page 32.

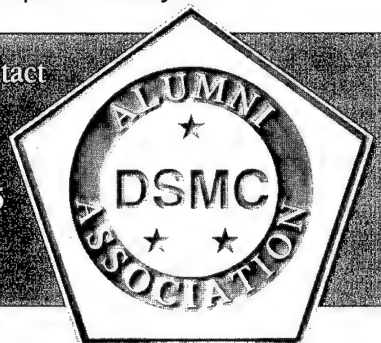
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- Congressional Update — Review of FARA, ITRA '96 et al
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Just Buy It At Radio Shack!

Myths About COTS in Military Electronic Applications

CMDR. ANDY MOHLER, USN

Today's procurement problems were yesterday's procurement solutions."

—Senator Sam Nunn

How can we preserve the technical superiority of U.S. forces at a price we can afford? One innovative approach is to use Commercial Off-the-Shelf (COTS) technology rather than develop unique systems from the ground up. Especially in the electronics industry, this approach seems to offer "low hanging fruit" ready for us to pluck. Many fine articles have been written on the potential advantages of a COTS approach. I am a strong advocate of COTS.

We must, however, recognize and manage some new risk areas that are built into the COTS approach. The risk areas aren't well known because the approach is not traditional. This article will address four common myths and misconceptions of COTS in military electronic applications.

Mohler is the Deputy Program Manager for Foreign Military Sales of the E-2C Hawkeye (PMA-231), Tactical Aircraft Programs, Naval Air Command, Arlington, Va. He is a '92 DSMC Alumnus and '96 graduate of the Senior Acquisition Course at the Industrial College of the Armed Forces.

Why Use COTS?

Simply put, the DoD cannot afford to do business as usual any more! We have chosen a strategy of high technology rather than superior numbers for our weapons systems. An entire defense industry emerged after World War II to support this approach.

With the perception of today's diminished threats, support for the DoD budget has declined dramatically. The continued rise of mandatory entitlement spending places ever increasing pressure on the dwindling remainder of discretionary spending, particularly the defense budget. Procurement of new systems has been especially hard hit, so the entire fleet of weapons systems is aging. End strength has been cut everywhere, which means the

remaining systems are asked to do more. DoD demand was a significant market force in the electronics industry for many years, but that has also declined. For example, all government purchases of semiconductors are only 1.3 percent¹ of the total \$100 billion market. Industrial research and development (R&D) spending has risen rapidly, but the DoD's spending has been declining since 1985. Today, DoD R&D spending is less than half that of commercial industry.² Defense industrial firms merge and disappear daily. Government facilities for repair and rework are also closing.

The threat today is not a monolithic, backward enemy that we at least understood well. Instead, it is unpredictable, geographically dispersed,

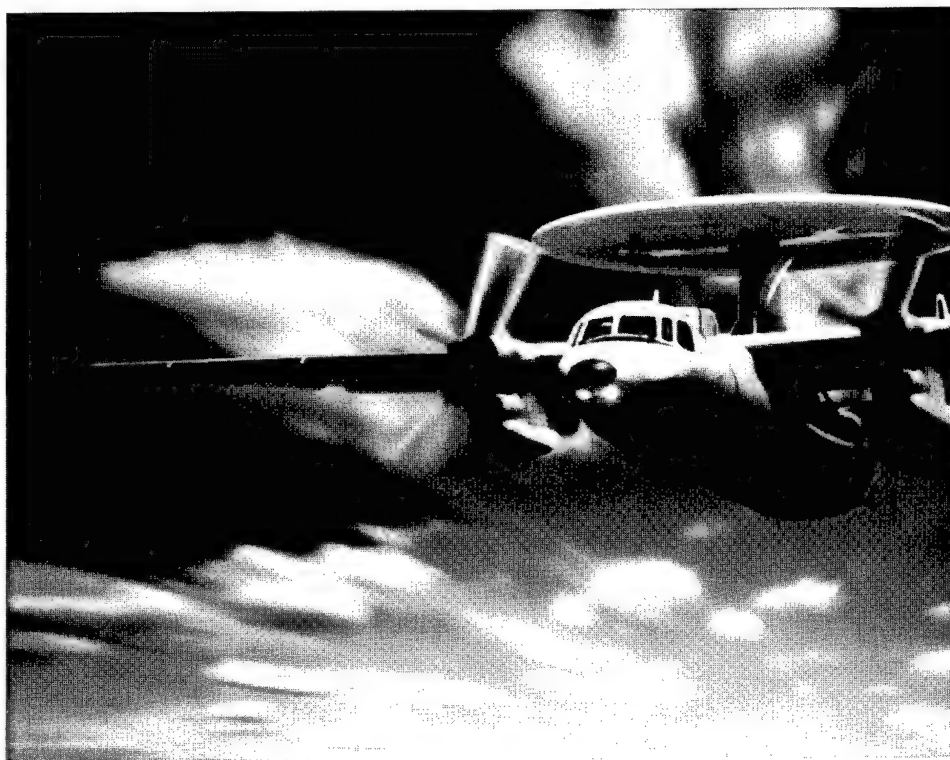
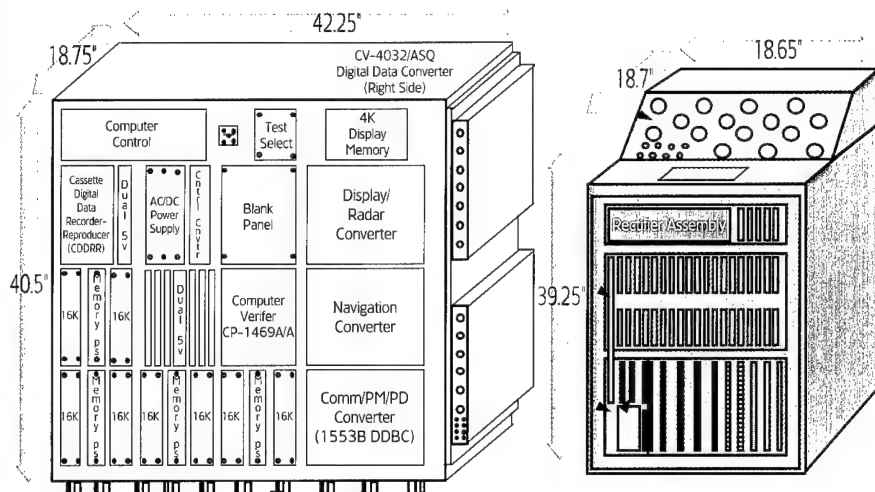


Illustration courtesy Northrup Grumman

Figure 1. Results of MCU Program Using MCOTS.



and technically well armed. The spread of weapons of mass destruction and the tendency toward terrorism place a great burden on rapid surveillance, analysis, and concentration of firepower.

As a result, we need a huge bang for the buck! Short of remobilization, we have no choice but to take advantage of the

HAWKEYE 2000 IS THE LATEST GENERATION E-2C HAWKEYE AND IS PLANNED FOR FLEET INTRODUCTION IN CALENDAR YEAR 2000.



dynamic advances in commercial product development. This is especially true in the rapidly advancing electronics industry.

COTS and the E-2C Hawkeye

In this article, I'll discuss some myths that impacted mission computer applications for carrier-based aircraft, specifically the E-2C Hawkeye. It's a good case to use because the Hawkeye Program is representative of many applications: a mix of obsolete and state-of-the-art in a very demanding environment.

The E-2C is the U.S. Navy's Airborne Early Warning aircraft. The "C" model has been in nearly continuous production since 1971, and is currently in production by the Northrop Grumman Corporation. The weapons system is a sophisticated sensor array which observes and classifies six million cubic miles of airspace every 10 seconds, displays its findings to three weapons systems operators, and transmits results on many data links. Like all carrier-based aircraft, weight, volume, and performance are at a premium.

In order to regain weight and volume margins for other sensor improvements, the Mission Computer Upgrade (MCU) program was begun in 1992. PMA-231 chose a Modified Commercial Off-the-Shelf (MCOTS) approach to replace the antiquated

existing computer. MCOTS could also be called "ruggedized" COTS, i.e., modified only as required to meet environmental needs. The goal was to replace the old mission computer with a state-of-the-art, open architecture system that could ride along the commercial development wave (Figure 1).

Some COTS Myths

Just when we think we have found the "solution" to all of DoD's problems, reality confounds us. Recognizing some COTS mythologies will help you avoid a bad decision based on a well-intentioned, but wrong-headed approach to COTS.

Myth #1: If you can't buy it at Radio Shack, you aren't using a COTS approach.

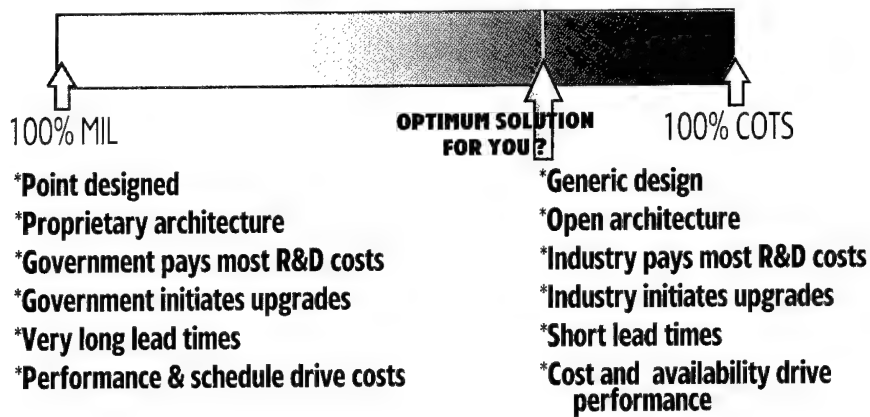
This inevitable argument really misses the whole point of the COTS approach. It means we have to remind ourselves that COTS is a means to an end, not an end itself. The desired end game is to "preserve the technological superiority of U.S. forces at an affordable cost."³ Consider the "COTS Meter" shown in Figure 2.

The old approach would have been to start the design from the 100-percent military unique point, and not consider alternatives regardless of cost. Now there are some equally zealous types who only want 100 percent COTS, and won't consider modifications. The common-sense approach starts with the right side of the "COTS Meter" and very carefully moves left to achieve the desired total performance. In DoD, the primary reason for "moving to the left" is to meet environmental demands of warfighting; such as extreme vibration, shock, salt fog, and thermal requirements.

Myth #2: COTS won't meet the warfighter's requirements.

This argument shows a lack of understanding about requirements. Requirements are a total package of cost, schedule, and performance. In the past, performance and schedule were

Figure 2. **The COTS Meter**



emphasized, usually at the expense of life-cycle cost. Today, cost is an independent variable, and it often determines the performance you can have.

However, some valid military performance requirements are often severe and distinct from commercial requirements. Commercial equipment would not be intentionally designed for such regimes; overdesigning the product would make it cost prohibitive for the commercial market. An example are the shock requirements to survive an aircraft carrier landing. On the E-2C, COTS circuit boards are sheltered using a shock-mounted enclosure.

In some cases, the customer's requirements may have to be challenged. Does the mission system really need to operate at -50° C (the traditional MIL-SPEC requirement) or would -20° C suffice? Is the customer really willing to escalate program costs and schedule to gain that last bit of performance at the edge of the thermal envelope? An alternative could be to increase spares to account for more projected failures. Users, developers, and independent test agencies need to see requirements as a total package. They should be willing to buy into tradeoffs for total value.

Myth #3: COTS will offer huge savings (and we'd like to begin collecting now, if you please).

It certainly does seem true that a COTS approach can save money and

time during development. If you upgraded your home computer from a 486 to a Pentium processor, you only paid a very small price for huge performance gains. Your cost avoidance is at least \$200 million dollars (the cost of Pentium development), and schedule avoidance is three years.⁴ Moreover, you get the low unit cost of a processor sold in mass quantities. In the case of the E-2C MCU, we also reap cost benefits through lower recurring costs, but most especially, from the commercial availability of software development systems (e.g., Ada compilers). Additionally, the processor speed of the prototype MCU has increased from 275 MHz to 375 MHz at no cost to the U.S. Navy! Great stuff!

But what about hidden costs? Squeezing the program manager for early "savings" from using COTS may actually result in added program cost later. We won't know until well into the Operations and Support (O&S) phase of projects that are just now in development. Most of a program life-cycle cost (80-85 percent) is generated in the O&S phase; this has been validated for many electronic and software projects.⁵ What if a computer vendor decides to move on to a more lucrative product line in 18 months, and your now-obsolete processor has no upgrade path? Upgrades may be available (e.g., 486 to Pentium), or you could be left with a COTS dinosaur. With the consolidation of vendors and the diminished market share of DoD, your program may be left with a huge

unprogrammed cost and a monopoly supplier. The privatization of government support facilities, especially software support activities and depots, will add to this dilemma.

Success or failure will depend upon your ability to choose a product line with broad commercial appeal. Vendors should be able to show solid and potential orders. They should be able to articulate a business strategy that includes several generations of upgrades. And finally, they should discuss their plans for solving your potential obsolescence problems. These are ways to partially mitigate risk, but it is premature to assume large program savings just because the start-up costs may be lower.

Myth #4: Commercial design is always more reliable than military equipment.

You would be hard-pressed to find commercial hardware that is more reliable than military gear in a military environment. With DoD mission critical software, there is always extensive testing and verification performed—dropping bombs in the wrong place is obviously disastrous. On the other hand, the reliability of commercial hardware and software is determined more by market forces in pure COTS applications than in a traditional MIL-SPEC system. A commercial banking system will demand a high degree of reliability, a graceful degradation capability, and sophisticated multi-level security. A financial management system for home use requires none of these, and you wouldn't want to pay for them. But, both COTS systems presumably satisfy their customers, or else the "invisible hand" of the competitive market causes a correction!

Of course, we don't have powerful market forces in defense procurement—we often have one buyer and one/few sellers. A careful examination of COTS offerings for the E-2C showed some major shortfalls in reliability, and in the amount of testing to "guarantee" performance. This brought on a very serious "COTS

Meter" discussion. Typical commercial Built In Test for hardware operates at a 90- to 95-percent rate of fault isolation, less than traditional MILSPEC but perhaps acceptable depending on the application. There aren't any equivalent reliability metrics yet for commercial software because the market doesn't demand them. Commercial software confidence levels (e.g., no "bugs," how long between "crashes") aren't usually known, postulated, specified, or advertised. You may be quite impressed with the perceived reliability of your desktop computer, but remember that it is optimally designed to operate in a benign environment, and the real consequences of failure are low. Questions to consider are:

- Is this good enough for a *mission critical system*?
- How much will you be willing to pay to gain the performance increase?
- How far "left on the COTS Meter" should you drive the hardware and software to get this, and what are the long-term cost implications?

Much has been written on the potential merits of COTS technology in mili-

tary applications. *I'm an enthusiastic supporter of COTS, but temper my enthusiasm with reality.* An aspirin for a headache is good—but a whole bottle at one sitting is deadly! We are breaking new ground with the COTS approach, and I suggest we tread carefully. My specific conclusions and recommendations follow:

- COTS means different things to different people. Resolve up front what it means to your design team, your contractors, and the decision authority.
- Remember the desired end: maintaining the technological edge of our fighting forces at an affordable price. COTS may offer a means to an end—but it isn't an end itself.
- There are many ways to use COTS. You need to define where you are on the COTS Meter.
- COTS may meet your requirements, but it may not. Be willing to go for the optimum of cost, schedule, and performance. Challenge requirements.
- It is unknown if COTS will offer the "huge savings" promised, if life-cycle costs are considered. Choose an approach that has broad commercial appeal. Don't choose the "Betamax"

approach over "VHS" just because Beta has slightly better performance.

- Be especially cautious of reliability issues, because the commercial and military markets differ widely. There are solutions, but they may require extra innovation.

ENDNOTES

1. "Firms Exit Military Chip Arena" (*Defense News*, August 28, 1995). Semiconductor Industry Association data as reported by Pat Cooper and Phillip Finnegan.
2. DoD data from *National Defense Budget Estimates for FY 1995*, p. 85. Industry data from the National Science Board, *Science and Engineering Indicators-1995*, p. 332.
3. Kaminski, Dr. Paul G., *Dual Use Technology: A Defense Strategy for Affordable, Leading-Edge Technology* (DoD unnumbered publication, February 1995), preface.
4. Malone, Michael S., "Chips Triumphant" (*Forbes ASAP*, February 26, 1996), p. 66.
5. Engwall, Richard L., *Designing for Dual-Use Electronics* (Westinghouse Electronic Corporation white paper), p.1.

DSMC NAMES ENLISTED PERSON OF THE YEAR



On January 30, 1997, at a ceremony conducted in Howell Auditorium, DSMC's main Fort Belvoir campus, the College named Air Force Staff Sgt. Phillip Copeland its Enlisted Person of the Year. "Phil" was chosen from among five nominees. Besides the Joint Service Commendation Medal, Phil received an engraved plaque, a \$100 savings bond, a \$100 gift certificate to the Post Exchange, a 96-hour pass, and a reserved parking space. A popular friend and colleague around the campus, Phil works as a Visual Information Specialist in the DSMC Visual Arts and Press Department, Division of College Administration and Services.

This Group Can Never Be Duplicated!

"Copy This—We're So Good We Worked Our Way Out of Here!!!" Much to the regret of the Defense Systems Management College, that's exactly what happened to its Print and Duplicating Services Department, Division of College Administration and Services. On January 29, 1997, in a ceremony held in the Packard Executive Conference Center at DSMC's main Fort Belvoir campus, the College said a reluctant farewell to most of the Department's employees. Although they will remain physically located on the DSMC main Fort Belvoir campus, effective February 3, 1997, the Department was realigned under the Defense Automated Print-

ing Service, Defense Logistics Agency. First called the Defense Systems Management School Printing Office when the College was founded back in 1971, the Department's staffing includes both military and civilian employees. Under the direction of Frank Scavotto, Chief Printing Officer, the Department introduced digital printing to the Fort Belvoir campus over the last two years. They succeeded so well they have become the model that other printing offices in the Washington metropolitan area seek to emulate.

Editor's Note. Turner and Cox remain DSMC employees.



KNEELING FROM LEFT: ARMY STAFF SGT. CHAD GRAMMER; NAVY LITHOGRAPHER 1ST CLASS ED RICHTER; AIR FORCE SENIOR AIRMAN STEVE WHITE; NAVY LITHOGRAPHER 3RD CLASS DUSTIN SELL; NAVY LITHOGRAPHER 1ST CLASS RUSTY SUMNER. STANDING FROM LEFT: JEFF TURNER; SYLVIA NANCE; NAVY LITHOGRAPHER 1ST CLASS ANDY STOWELL; LOU RAGER; JENNIE SORENSSEN; SCAVOTTO; NAVY LITHOGRAPHER 3RD CLASS HUB HUBBARD; DENNIS COX.

3 Easy Steps

FOR INDUSTRY EXECUTIVES TO ATTEND DSMC'S ADVANCED PROGRAM MANAGEMENT COURSES



1.

**CONVINCE YOUR
SUPERVISOR OR YOUR
TRAINING OFFICER
THAT YOUR COMPANY
CAN SAVE BIG BUCKS
WITH A BETTER
TRAINED
EMPLOYEE—YOU!**



2.

**DECIDE WHETHER YOU
WANT TO TAKE
SPECIALIZED 1- to 2-
WEEK SHORT
COURSES
OR THE 14-WEEK
ADVANCED PROGRAM
MANAGEMENT**



3.

**PICK UP THE PHONE.
GIVE YOUR CODSIA
REP A CALL.
WE HAVE OPENINGS IN
OUR NEXT 2 APMCs AS
WELL AS OUR SHORT
COURSES.
TUITION IS FREE!**

THREE EASY STEPS...AND WE'LL HELP YOU ALL WE CAN. Defense industry executives are invited to attend the Defense Systems Management College and learn the defense acquisition management process side-by-side with their military and government civilian counterparts. Vacancies are now available in DSMC's highly acclaimed 14-week Advanced Program Management Course at the main Fort Belvoir, Virginia, campus. Tuition is waived for eligible industry students. The next APMC class is 12 May-15 August 1997; the following class will be 8 September-12 December 1997. Contact Ruth Franklin, Council of Defense & Space Industry Associations (CODSIA) Registrar, at (202) 371-8414 for information.

THE DEFENSE SYSTEMS MANAGEMENT COLLEGE

A MEMBER OF THE DEFENSE ACQUISITION UNIVERSITY CONSORTIUM

HTTP://WWW.DSMC.DSM.MIL (703) 805-2828

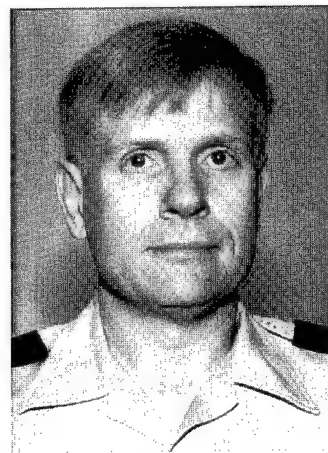




Arrmy Lt. Col. Aaron R. Andrews became the Director of the Automation Operations and Education Department/Program Manager for Electronic Campus for the Division of College Administration and Services, DSMC, effective December 1996. Prior to joining the DSMC staff, Andrews served as Product Manager for Automatic Identification Technology;

Program Executive Office, Standard Army Management Information Systems (PEO STAMIS), Fort Belvoir, Va.

Arrmy Lt. Col. Orlando J. Illi, Jr., retired effective March 31, 1997. During his DSMC tenure, Illi served as the Director of the Automation Operations and Education Department for the Division of College Administration and Services. Prior to his DSMC assignment, Illi served as Chief of the Maintenance Automation Branch, U.S. Army Ordnance Center and School, Aberdeen Proving Ground, Md. Illi's career spans 20 years of active duty in the U.S. Army.



Arrmy Maj. David G. Belva assumed the responsibilities of the Executive Officer for the Dean of the Division of College Administration and Services, DSMC, effective January 1997. He comes to the College after serving as Executive Officer/Senior Software Engineer at the U.S. Army Information Systems Software Center, Fort Belvoir, Va.

Air Force Lt. Col. James W. Lamb became the Executive Officer to the Commandant, DSMC, effective February 1997. He previously served at the College as a professor assigned to the Academic Programs Division. He joined the DSMC faculty from his previous assignment as Joint Requirements Oversight Council Coordinator, JROC Issues and Actions Division, the Pentagon.



Air Force Master Sgt. Fredrick S. Edelkamp retired from military service effective June 30, 1997. Edelkamp served as Acting Director of the Video Services and Maintenance Department, DSMC. He previously served as the Noncommissioned Officer in Charge of the Video Services Department. Edelkamp's military career spanned 20 years of active

duty in the U.S. Air Force.

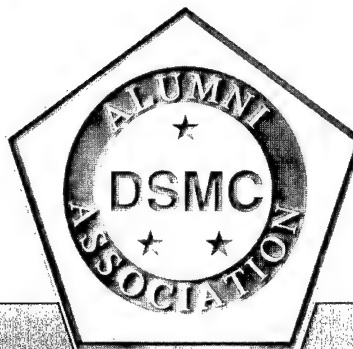
Arrmy Lt. Col. John Peeler recently became a member of the DSMC faculty, Principles of Program Management Department, Faculty Division, effective January 1997. Peeler previously served as the Executive Officer to the DSMC Commandant from July 1996 until January 1997. Prior to joining DSMC, Peeler served in the Office of the Secretary of the Army for Research, Development, and Acquisition.



THE RULES HAVE CHANGED!

DSMC Alumni Association News!

**DSMC Short Course Graduates
Gain Full Membership Status!**

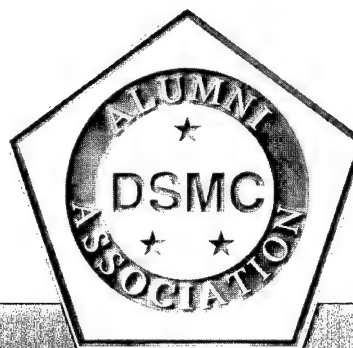


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**DSMC Short Course Graduates
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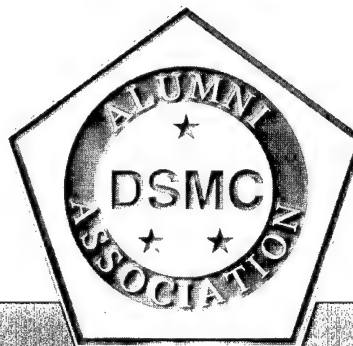


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Short course graduates gain full membership status!!

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 Company/Agency
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1997 ACQUISITION RESEARCH SYMPOSIUM

THEME

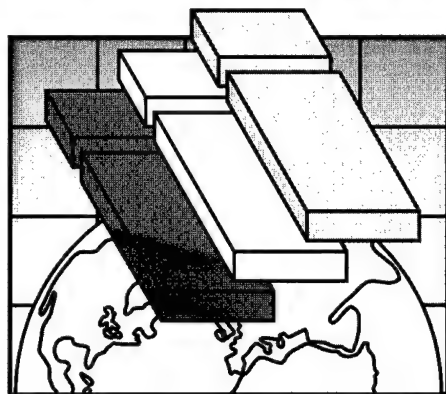
Acquisition for the Future:
Imagination, Innovation, and
Implementation

SUBTHEME

Acquisition Reform:
"Sustaining the Momentum
— Full Speed Ahead"

DATES

June 25-27, 1997



LOCATION

Doubletree Hotel, 1750 Rockville Pike, Rockville, Maryland

[METRO Red Line, Twinbrook Station]

PLENARY SPEAKERS

Keynote Speaker: Norm Augustine, Chairman, Lockheed Martin Corporation (June 25th)

Phillip Odeen, Chairman BDM International; Member, Defense Science Board

Honorable Steven J. Kelman, Administrator, OFPP/OMB

Senator John Warner (R-Va.) [invited]

PANEL PRESENTATIONS

- "Industry Perspectives on Acquisition Reform — Where Are We Now, and Where Do We Go"
- Civilian Agency Acquisition Executives — "Innovation Outside of DoD"
- DoD Service Acquisition Executives — "Looking Ahead"
- "QDR Impact on Acquisition"

CONCURRENT SESSIONS

Acquisition Research Papers presented during 32 concurrent sessions on topics such as: Acquisition Management Education & Workforce; Acquisition Planning & Management; Commercial Products; Industrial Base/Privatization; and Process Reengineering.

CONFERENCE INFORMATION

The Symposium begins at 8:00 a.m., on Wednesday, June 25, 1997, and ends at 12:00 p.m. on Friday, June 27, 1997. A continental breakfast will be offered daily, and lunch will be served on Wednesday and Thursday. There will be a reception held at the hotel on Wednesday evening.

HOTEL RATES & REGISTRATION

Hotel Rates and Registration. Hotel rates are \$124.00 (single) and \$144.00 (double) per night (plus tax). For reservations, call the Doubletree Hotel, 1-800-222-TREE, or (301) 468-1100. To receive these rates, state that you are attending the Acquisition Research Symposium and make reservations no later than May 29, 1997.

REGISTRATION FORM

Pre-Registration: \$215.00

(received & prepaid by May 31, 1997)

Late Registration: \$265.00

(received after May 31, 1997)

Mail this registration form (or a copy) and
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Attn: Administration Department
1912 Woodford Road
Vienna, VA 22182

(703) 448-9231 or (800) 344-8096 or
FAX 703-448-0939 (for credit card payment)

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Becky Stauffer, (703) 351-4415 or

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Please identify any special accommodations required:

.....

Kaminski Distributes New Defense Acquisition Career Development Council (DACDC) Charter

Council's Senior Acquisition Decision Makers Poised to Provide Increased Guidance, Leadership, Counsel to DSMC Managers

COLLIE J. JOHNSON

Perhaps you've never heard of the Defense Acquisition Career Development Council (DACDC), chaired by Under Secretary of Defense (Acquisition and Technology), Dr. Paul G. Kaminski. However, the Council is alive and well, and working actively to ensure the Department of Defense (DoD) has the most professional, educated, trained, developed, and qualified Acquisition Workforce (AWF) in the entire world. And they've assembled DoD's senior acquisition leaders to make it happen.

Background

The Under Secretary of Defense (Acquisition and Technology) (USD[A&T]) established the DACDC to advise him on policies, programs, and support in executing statutory requirements for the education, training, and career development of the DoD AWF.

Specifically, the Council's primary mandate is to assist the USD(A&T) in carrying out the provisions of DoD Instruction (DoDI) 5000.58.¹ Toward that end, they assist in formulating policy for the education, training, and career development of the acquisition workforce, approving training budgets, reviewing Component Acquisition

Career Program Board proposals, performing oversight of the execution of DoDI 5000.58 and related AWF issuances, and assuring, so far as is practicable, uniform implementation of DoD policies and procedures.

Strengthened and Revitalized

In a move designed to strengthen and revitalize the DACDC, Kaminski announced several changes to the Council's charter in a Dec. 23, 1996, memorandum to the Council associates and members:

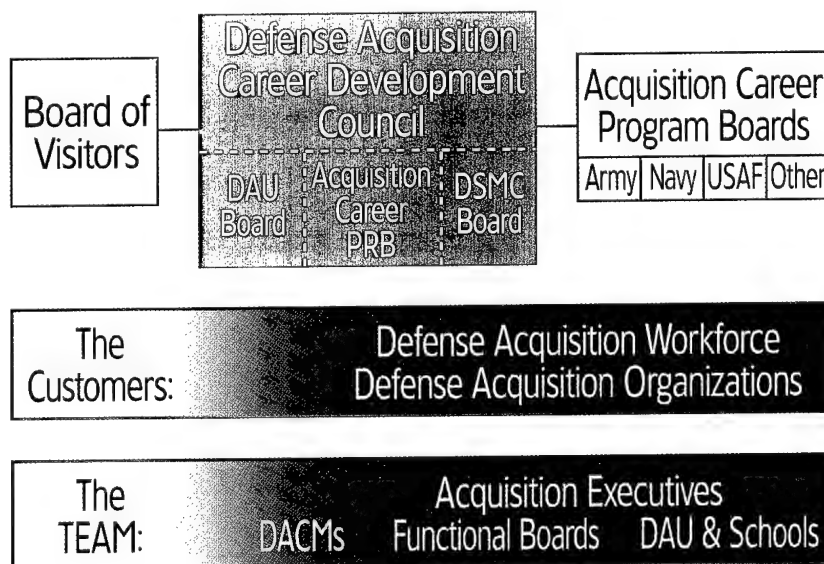
...I have made several changes to strengthen the Council. These

modifications streamline the membership, include industry representation, increase participation of customer organizations, [and] treat the Defense Systems Management College (DSMC) separately from the Defense Acquisition University (DAU)...

Among those changes was the establishment of the DSMC Board as one of three Boards that will assist the Council in carrying out its functions.

This restructuring, as depicted in Figure 1, recognizes DAU, DSMC, and

Figure 1. Acquisition Career Program Organizations



Johnson is managing editor, Program Manager magazine, Visual Arts and Press Department, Division of College Administration and Services, DSMC.

the Acquisition Career Program Review Board (ACPRB) as separate standing boards, and gives each an opportunity to surface its educational concerns, programs, and requirements to some of government's most senior acquisition officials. To wit, the composition of the DSMC Board, chaired by Principal Deputy Under Secretary of Defense (Acquisition and Technology), R. Noel Longuemare, includes:

- Deputy Under Secretary of Defense (Acquisition Reform)
- Commander, Army Materiel Command
- Commander, Air Force Materiel Command
- Principal Deputy Assistant Secretary of the Army (Research, Development, and Acquisition)
- Principal Deputy Assistant Secretary of the Navy (Research, Development, and Acquisition)
- Principal Deputy Assistant Secretary of the Air Force (Acquisition)
- Commander, Marine Corps Systems Command
- Commander, Defense Contract Management Command
- Deputy Assistant Secretary of Defense (C³I, Acquisition)
- Army DISC⁴
- Deputy Assistant Secretary of the Navy (C⁴I)
- Director, DISA
- Director, Information Dominance (SAF/AQI)
- Director, Acquisition Program Integration (OUSD[A&T])
- President, Defense Acquisition University

DSMC's mission requires that the College—

Promote and support the adoption and practice of sound systems management principles by the acquisition workforce through education and training, research, consulting, and information dissemination.

- Executive Secretary: Commandant, DSMC
- Advisor: Director, Acquisition Education, Training, and Career Development

The DSMC Board's charter reflects its commitment to support and complement the goals and ongoing initiatives of the College: *Review current operations and advise the Commandant, DSMC, regarding future plans and initiatives, and identify and provide customer feedback for products and services.*

This is an exciting change for the College—an opportunity to reap the benefit of specific, College-focused counsel and guidance from many of the most influential acquisition policy makers and senior leaders in government.

DSMC Presentation

On January 8, 1997, the Council met for the first time under its revised charter. Each of the three boards was represented. Tom Crean, President, Defense Acquisition University (DAU), reported on the initiatives, strategies, and activities of the DAU. Likewise, Dr. Jim McMichael, Director of Acquisition Education, Training, and Career Development, Office of the Deputy Under Secretary of Defense for Acquisition Reform, briefed the activities of the Acquisition Career Program Review Board, including critical program areas. Army Brig. Gen. Richard A. Black, DSMC Commandant, reported to the DSMC Board and other Council members on several College initiatives and activities intended to:

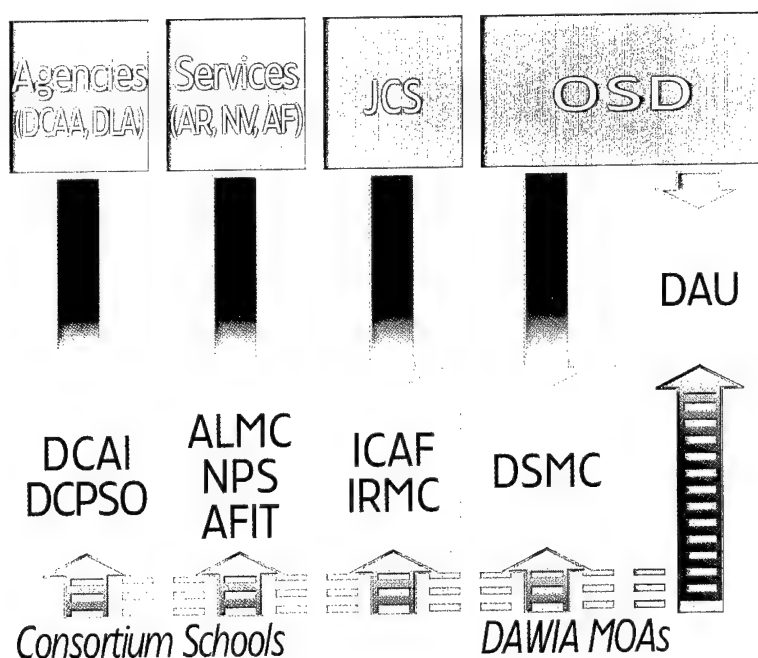
- describe where the College stands now and how it meets the Council's needs;
- obtain the Council's approval of DSMC's future-year plan;
- obtain the Council's guidance regarding Program Budget Decision 081 Fee-for-Service option (discussed more fully in succeeding paragraphs); and
- review DSMC's *top-line resources* to support its programs.

Black began his presentation by describing DSMC's role as a member of the DAU consortium schools, with the mission of educating, training, conducting research, consulting, and disseminating information on behalf of the acquisition workforce. DSMC's mission requires that the College—

Promote and support the adoption and practice of sound systems management principles by the acquisition workforce through: education and training, research, consulting, and information dissemination.

As a member of the DAU consortium of schools, DSMC recognizes its role as a member of a team providing edu-

Figure 2. Education Organizations — Oversight and Relationship



cation and training in a centrally managed, decentrally executed manner to the AWF. In describing that role, Black also explained the oversight and relationship of each consortium school to its higher headquarters (Figure 2), as well as several ongoing and future initiatives.

Education and Training Courses Offered by DSMC (DAU and Non-DAU). Ninety percent of DSMC-taught courses are Level II (Intermediate) or Level III (Advanced).

Student Training Weeks. The College planned, developed, and achieved a remarkable growth in student training weeks. From FY 90 to FY 97, DSMC experienced an 89-percent increase (from 17,000 in FY 90 to over 32,000 in FY 97).

Course Offerings. DSMC currently teaches 69 percent of its courses at the DSMC main Fort Belvoir campus, 19 percent at Regional locations, and 12 percent at other on-site locations.

Research, Consulting, and Information Dissemination Products and

Services. These products and services focus on program offices, program executive offices, systems commands, OSD and Service staffs, and other defense entities, as requested. Black cited several ongoing or completed specific research, consulting, and information dissemination projects and products.

In FY 96, the College expended over 13,500 manhours in conducting research, and 15,000 manhours in consulting efforts. *Program Manager* magazine and *Acquisition Review Quarterly* journal reached an audience of 18,000 (bimonthly) and 14,000 (each quarter) respectively. Also in FY 96, the College distributed 73,000 guidebooks and received hundreds of thousands of hits on the DSMC Home Page, now posted on the World Wide Web (<http://www.dsmc.dsm.mil>).

DSMC's Future Direction

Black focused the second part of his presentation on the College's future and how DSMC will respond to future educational challenges.² The following paragraphs outline those challenges, which DSMC will meet or exceed

using materials, strategies, and techniques consistent with the fast-paced culture of acquisition reform and the dynamic times in which the College works to serve the AWF.

DSMC Customer Survey. As a result of an "Azimuth" Summary from its customers, DSMC determined that the College must expand its education efforts to ultimately reach out to the entire Defense Acquisition Workforce Improvement Act (DAWIA)-defined AWF and beyond. The College must adapt its education efforts to differing Service acquisition career progressions. DSMC must work closely with the DAU and pursue innovative (long distance, broadcast education) delivery means for its courses. And finally, DSMC must collaborate with Defense Acquisition Career Managers (DACM), Deputy DACMs, and Materiel Commands to ensure a closer supplier/customer relationship.

DSMC's Adaptation to Changing Environment/Mission Implications. Environmental changes in the DoD AWF have profound mission implications for the College. As a result of a smaller AWF, DSMC needs to support the DAU in its efforts to train the workforce to be multi-disciplined. *Reduced budgets* generate a need to produce more with less. *More modifications to existing systems* prompt the need for tailored education to meet specialized requirements. *Acquisition reform*—encompassing all its regulatory, legislative, strategic, and policy implications—demands that DSMC seek new and improved acquisition management tools. Information technology, specifically in the form of electronic communications, makes distance learning to reduce education lead-time an attractive option the DAU and the College must pursue.

Five Strategic Initiatives

To meet the challenges, DSMC developed a plan that presupposes the active support and involvement of every DSMC staff and faculty member. Five strategic initiatives will serve as

the foundation and roadmap by which the College will meet those challenges:

No. 1: Expand Regional Operations

DSMC's objective is to increase course availability at concentrated AWF locations. This will reduce student temporary duty funding and time away from home. The College also wants to standardize classrooms, including computers, audio-visual systems, furniture, fixtures, and equipment. Although there will be an initial set-up cost for each classroom, no additional faculty requirements will be generated.

No. 2. Implement Distance Learning Techniques

The College intends to bring acquisition education directly to the AWF at concentrated AWF locations. This will require that it package some DSMC courses into a distance learning format. As part of DSMC's distance learning strategy, the College will capitalize on regionalization infrastructure to enable curriculum development, course updates, and teaching electronically from DSMC to other consortium schools and AWF locations. This initiative, in collaboration with DAU, is a work in progress.

No. 3. Provide Continuing Education

The College, in collaboration with the DAU, will use infrastructure established at hubs and satellites, and distance learning techniques to provide continuing education to the AWF. As part of its continuing review and, where necessary, course redesign, DSMC will package continuing education into modules appropriate to distance learning. And finally, the College will work with host installations to improve acquisition management training materials and availability at local Education and Training Resource Centers.

No. 4. Expand research and consulting services for the AWF.

The College will continue its momentum to provide quality products and services to more of the AWF. DSMC intends to do this by leveraging its access to DoD policy makers, program

The College's current plan continues to give first priority to the DAWIA AWF, but also includes non-DAWIA DoD personnel whose jobs impact the acquisition process, such as users, requirements generators, materiel managers, and supporting staff.

executive officers, and program managers.

No. 5. Broaden non-DAWIA Student Base

The College's current plan continues to give first priority to the DAWIA AWF, but also includes non-DAWIA DoD personnel whose jobs impact the acquisition process, such as users, requirements generators, materiel managers, and supporting staff. In addition, DSMC wants to expand our educational opportunities to defense industry members as well as non-DoD employees from other federal agencies. This initiative will not only benefit the defense AWF, but also result in better working relationships and cooperation with our non-DoD and defense industry contractors.

Emphasis on Fee-for-Service Activities

Since FY 94, DSMC has decreased its personnel staffing by 18 percent. The College plans further reductions to achieve its goal of 29 percent by FY 01. To help reach that goal and not have to go beyond it, the Council directed

DSMC to implement a fee-for-service approach in the area of consulting, which will be spread across the entire faculty to maintain currency and better serve the AWF.

Under the management of Dr. Jim Price, Dean, Research, Consulting, and Information Division (RCID), fee-for-service within DSMC would be implemented on a phased approach to test viability. DSMC will work to increase its consulting efforts while simultaneously increasing its fee-for-service consulting efforts. Minor consulting efforts requiring five days or less would continue to be mission-funded (free of charge to the customer). Major consulting efforts, however, requiring more than five-days' effort, would be paid for by the requesting organization.

DSMC's plan for implementing fee-for-service for consulting efforts has several advantages. It initiates fee-for-service on a limited, trial basis; results in OSD continuing to fund core/general consulting efforts; conducts major project consulting efforts as fee-for-service; and allows for annual reassessment.

What's Ahead?

The next meeting of the DSMC Board is scheduled for March 17, 1997. The Council reconvenes in October 1997. DSMC is committed to fully supporting and capitalizing on the expertise and guidance it receives from the DSMC Board and the DACDC. As the initiatives and plans discussed in this article are implemented, changed, added to, or deleted, the College will keep you—the readers and students—fully informed.

END NOTES

1. DoDI 5000.58, "Defense Acquisition Workforce" (Washington, D.C.: Government Printing Office), Jan. 14, 1992.

2. *The DSMC Corporate Plan FY 97* contains a complete and detailed summary of DSMC's future direction, plans, initiatives, and ongoing programs.

FROM THE COMMANDANT

The first signs of spring are apparent here at Fort Belvoir as I write this column—trees budding, flowers blooming, and Canadian geese flying north. Other signs familiar to those of us in the professional acquisition workforce (AWF) are typical acquisition cycle events that have been recurring without fail for nearly 40 years—congressional budget hearings (lots of them), Program Objective Memorandum (POM) meetings, building meetings, and a wide array of program reviews.

This year a few "extra" activities are keeping the lights burning in the Pentagon until late at night, such as the Quadrennial Defense Review and its follow-on National Performance Review. Also, our senior acquisition leaders and policy makers are busy formulating, coordinating within the Office of the Secretary of Defense (OSD), and discussing new acquisition reform (AR) activities and initiatives with the Services, the new Secretary of Defense, and members of the Congress. They are working at an accelerated pace to try to get these initiatives into this year's legislation.

Ongoing activities here at the Defense Systems Management College (DSMC) are also keeping the lights on late into the night. For most students, class activities are longer each day. Our faculty are working many extra hours updating all our courses with the latest policy and AR initiatives; and are also inserting Automated Information Systems material into the courses that reflect the Clinger-Cohen Act as well as the earlier merger of the DoDI 8000 series into the 5000 series. Also, they are planning for the upcoming transition of many courses into a distance learning format in order to reach more of the workforce more quickly.

Today, the last day of winter, many AWF members, including those here at the College's Fort Belvoir campus, are conducting Acquisition Reform Day II activities. Appropriately, the theme for this year's AR activities is "Sustaining the Momentum—Full Speed Ahead." (The results of this week's activities will be reported in a later issue.)

On January 8, the Defense Acquisition Career Development Council (DACDC) met for the first time under its revised charter, bringing together senior OSD and Service leaders to review the AWF career development needs and policies. This was the first meeting in recent years of a high-level group chaired by the Defense Acquisition Executive (DAE) to look at the AWF current education and training status, their needs for the future, and to review planned actions to address those needs. As detailed in our article on p. 60 of this issue, three boards, including the DSMC Board, reported to the Council. Also reporting to the Council at that meeting was Dr. Jacques Gansler, Chairman of the Defense Acquisition University (DAU)/DSMC Board of Visitors (BOV).

The Council directed that DAU move out rapidly on distance learning using Information Age technologies to reach more of the AWF faster and better. With slight modifications, the Council also approved DSMC's Corporate Plan. Overall, it was a substantive, positive meeting. Our senior acquisition leaders and policy makers fully recognize that, in order to institutionalize AR, we collectively must continue focusing our attention on the education and training needs of the workforce.

On March 4, the DAU/DSMC BOV (representatives from industry and academia) met to review DAU/DSMC operations and future plans. The BOV charter is to provide insights to the President, DAU and the Commandant, DSMC on organization management, curricula, methods of

instruction, facilities, and other matters of interest. The backgrounds and previous work in government, education, and industry of the BOV members enabled them to provide valuable advice that is already stimulating improvement in many areas.

On March 17, as part of its ongoing role on the DACDC, the DSMC Board met to review the recent past and present operations of the College and to comment on future plans, including the POM planning to resource those plans, and to provide customer feedback as representatives of the AWF. In addition to the initial implementation plans of the DSMC Corporate Plan, much discussion focused on the use of distance learning to reach the AWF and the larger AWF (400,000) more quickly and efficiently with quality instruction.

On March 18, representatives of all the consortium schools met at DAU to review and provide suggested revisions to the DAU Draft Distance Learning Plan. The objective was to develop a plan that would comply with the DACDC Action Memo, which included DAE direction that at least 10 percent of DAU's courses would be converted and delivered by Information Age technologies before the end of FY 97, and an additional 15 percent by the end of FY 98.

As you can see, there are many things being done to improve the capability of the AWF by bringing to them acquisition education and training that is *better, faster, and cheaper*.

By the time you receive this issue, DSMC will have opened its new Mid-Atlantic Region at Fort Monmouth, New Jersey, the home of the Army's Communications and Electronics Command. Importantly, that campus is within one day's drive of Picatinny Arsenal, Lakehurst Naval Air Warfare Center, and the Defense Personnel Support Center in Philadelphia.

This issue includes the farewell message from Dr. Paul Kaminski, the Under Secretary of Defense for Acquisition and Technology. Secretary of Defense Cohen recently described him as "the Ben Franklin of Acquisition Reform." Clearly, he and former Secretary of Defense Perry were the founding fathers in conceiving the revolutionary change to the 40-year-old DoD acquisition process. However, I believe most would agree that converting the concept into reality is principally the result of Dr. Kaminski's vision, executive abilities, patience, and perseverance.

I am sure Dr. Kaminski would attribute his success to a committed professional acquisition team—but *he led the team*. He led the team like a player-coach, leading the team, yet at the same time always a participant. And because of his charismatic leadership we, the AWF, have done more and better than we ever thought we could. Thank you Dr. Kaminski, and best wishes to you in all your endeavors.

**— Brig. Gen. Richard A. Black, U.S. Army
Commandant**



Dr. Kaminski's Farewell Message to the Acquisition Workforce

People are our most important asset. Our defense acquisition workforce is blessed with some of the very best and brightest people in the world. During the past two and one-half years, I have observed on many occasions that our workforce is highly dedicated, motivated, and becoming more empowered with each passing day.

Our acquisition workforce is the envy of my counterparts around the world. A couple of months ago, my Russian counterpart asked me how many members of our workforce actually had the authority to sign contracts on behalf of the United States Government. In Russia, decisions are highly controlled—very few people have this authority. My counterpart was floored by my response: a couple of *thousand* contracting officers can sign contracts. At that moment, it became apparent to my Russian colleague that the strength of our system was our *people*.

Quite often, I hear the prevailing view expressed in Washington, D.C., that the defense acquisition workforce is too large. Very little thought is given to the fact that the workforce must first become *better* before it can become *smaller*. I have worked with very small teams that were extremely effective in managing highly classified programs. A key factor was the quality of the people—we were able to select the very best for our team. Our workforce is qualitatively better today than it was four years ago, but we still have a long way to go to create a culture of continuous education and training.

One of the most significant accomplishments made over the past two and one-half years has been the wholesale reengineering of the way we support the warfighter, using teams working together in parallel rather than our past sequential, serial approach. Integrated Product Teams—composed of warfighters, testers, trainers, doctrine writers, acquirers, and their industry contractors—have dramatically improved the way we do business and have significantly shortened our acquisition cycle times. This process reengineering initiative began with OSD-led Advanced Concept Technology Demonstrations (ACTD), continued with the fielding of a Bosnia Command and Control Augmentation (BC²A) sys-



tem, and has expanded with the Army's Force XXI experiment, the Navy's "Smart Ship" project, and the stand-up of the Air Force's Battle Labs.

I take the most pride in seeing our people willing to think "out-of-the-box," pushing hard to be better. It means our incentives and rewards are beginning to work. Our program managers are not afraid to take prudent risks to do what is best. There is a much greater sense that we are all on the same team and are all working toward a common goal.

It has been a pleasure to work with you—the finest acquisition professionals in the world. I wish you all the best in your future endeavors.

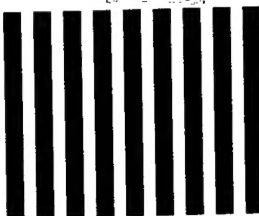
— Paul G. Kaminski
Under Secretary of Defense
(Acquisition & Technology)



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